

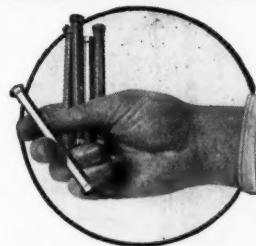
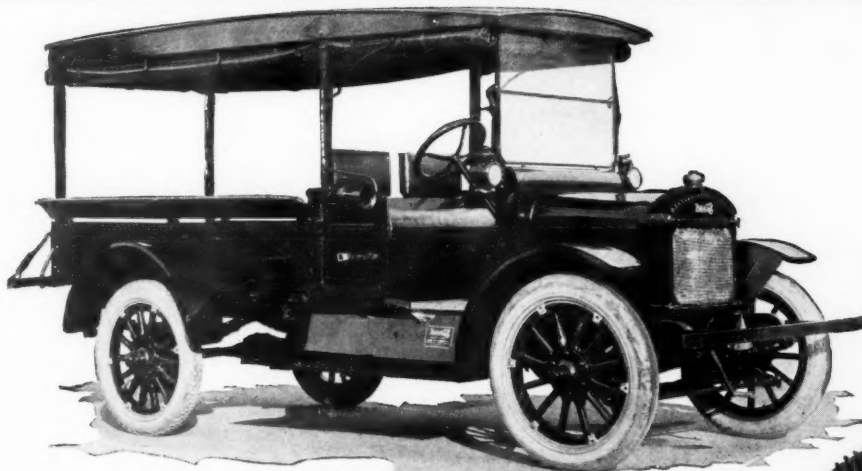
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLI
Number 10

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, SEPTEMBER 4, 1919

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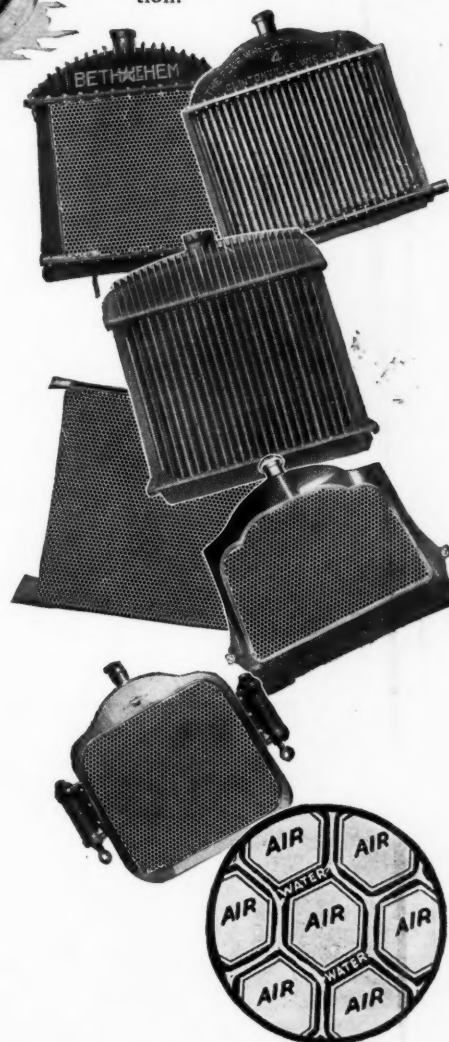
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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLI.

NEW YORK—THURSDAY, SEPTEMBER 4, 1919—CHICAGO

No. 10

Regulation of Air Navigation in United Kingdom

The Object in Presenting This Week the Rules Promulgated for the Control of Aviation in England Is to Illustrate to What Extent Other Countries Are Aiding the Aircraft Industry to Get a Foothold in Civil Life. The Added Comment of an Englishman, High in Aviation Service, Is Interesting.

LONDON, July 15.

RULES for the government of aircraft arriving or departing from the United Kingdom are announced by the British Government through Winston S. Churchill, Secretary of State for Air, as Amendments to The International Regulations for Air Navigation. The International Regulations, which were drafted by the Inter-Ministerial Commission of Civil Aeronautics at Paris, were published in AUTOMOTIVE INDUSTRIES April 10, this year.

The British Government, by these rules, has entered the aviation business. It establishes and conducts the landing fields and makes charges for certain services rendered, licenses and controls pilots and works for the safety of aircraft travel, but in no sense enters into the competitive commercial flying field. The restrictions on carrying mail to foreign countries are especially explicit. As a part of the Government service, it is planned to equip the landing fields with a special meteorological service. The amendments follow:

AMENDMENT I

Rules as to Aircraft Arriving in or Departing from the United Kingdom.

Preliminary

1. (1) For the purposes of the rules in this schedule the following aerodromes are appointed aerodromes, that is to say:

New Holland, Lincolnshire.
Hadleigh, Suffolk.

Lympne, Kent.

Hounslow, Middlesex.

Provided also that the Secretary of State may by directions add any aerodrome to the list of appointed aerodromes or remove any aerodrome from that list.

(2) For the purposes of the rules in this schedule:

"Importer" has the same meaning as in the Customs Consolidation Act, 1876.

"Commissioners" means Commissioners of Customs and Excise.

"Examination station" means a space at an appointed aerodrome approved by the Commissioners as an examination station.

"Pilots" include persons in charge.

Other expressions have the same meaning as in the general provisions of these regulations.

Arrival at and Departure from Appointed Aerodromes

2. No aircraft entering the United Kingdom from abroad shall land for the first time in the United Kingdom except at an appointed aerodrome; Provided that this rule shall not apply where an aircraft is compelled to land before arriving at an appointed aerodrome, owing to accident, stress of weather, or unavoidable cause, in which event the procedure laid down in rule 21 (hereafter) will be followed.

3. No aircraft shall fly to a place outside the United Kingdom unless it has departed from an appointed aerodrome.

4. (1) No person in any aircraft entering the United Kingdom shall carry or allow to be carried in the aircraft:

(a) any goods the importation of which is prohibited by the laws relating to Customs;

(b) any mails, except with the permission in writing of the Postmaster-General.

(2) No person in any aircraft entering the United Kingdom shall break or alter any seal placed upon any part of the aircraft or upon any goods therein by a Customs officer at the aerodrome at which he departed for the United Kingdom.

5. No aircraft shall enter or leave the United Kingdom, having any secret or disguised place adapted for concealing goods.

6. The pilot of any aircraft arriving at an appointed aerodrome from a place outside the United Kingdom shall, on landing, forthwith take his aircraft to the examination station at that aerodrome; provided that a pilot shall not be deemed to have contravened or failed to comply with this rule if he proves that circumstances over which he had no control prevented him from taking his aircraft to the examination station, and that, after the report required by rule 7 (hereunder) had been duly made by him, all goods carried in the said aircraft were removed to the examination station in the presence of an officer of Customs and Excise or some person duly authorized by the Secretary of State.

7. Within twenty-four hours after the landing at any appointed aerodrome of an aircraft from a place outside the United Kingdom the pilot shall:

(a) make a report to the proper officer of Customs and Excise in the form prescribed by the Commissioners; and

(b) truly furnish the several particulars required by such form; and

(c) deliver to such officer with such report his log book, manifest, and declaration of the goods on board his aircraft signed by the proper Customs officer at the aerodrome from which he departed for the United Kingdom; and

(d) land at such aerodrome for examination of baggage all passengers carried in such aircraft, and, after making such report shall produce, and, if required to do so, shall land, all goods in such aircraft for examination.

8. If at any aerodrome or other place within the United Kingdom goods or passengers are loaded for conveyance by air to an appointed aerodrome, the pilot shall obtain from the proprietor of the aerodrome of departure a certificate of departure in the form prescribed by the Secretary of State and the Commissioners, and on arriving at the appointed aerodrome the aircraft and all goods and passengers carried therein shall, on production of such certificate, be exempt from inspection by an officer of Customs and Excise, unless such officer has reason to suspect that the aircraft has, since the issue of such certificate, called at a place outside the United Kingdom.

9. The pilot of every aircraft in which goods are to be exported shall, before any goods be taken on board, deliver to the proper officer of Customs and Excise a notice of departure for a foreign destination in the form prescribed by the Commissioners, in which shall be truly stated the particulars required by such form.

10. (1) Every pilot of an aircraft carrying goods to any place outside the United Kingdom shall deliver to the proper officer of Customs and Excise at an appointed aerodrome, together with any log books belonging to the aircraft, an application for clearance from that aerodrome in the form prescribed by the Commissioners, in duplicate, and also, if the aircraft carries any goods, a manifest and declaration in the form prescribed by the Commissioners, declaring the goods and stores on such aircraft, and shall truly state therein the particulars required by such forms respectively; and such forms, when signed by such officer,

shall be the clearance and authority for the aircraft to proceed to its foreign destination.

(2) No pilot shall depart in any such aircraft from the United Kingdom until he has obtained such authority, or shall, after obtaining such authority, call at any other place in the United Kingdom before proceeding to his foreign destination. Any pilot intending to land at one or more appointed aerodromes before proceeding to his foreign destination shall apply for the said clearance and authority at the last appointed aerodrome at which he lands.

Importation, Entry and Unloading of Goods

11. No person importing goods in an aircraft shall bring the goods into any place in the United Kingdom other than an appointed aerodrome, or shall unload the goods from any aircraft except at an examination station (unless such goods are unloaded in the presence of an officer of the Customs and Excise under the provisions of rule 6 above) and shall not unload the goods except between such hours as the Commissioners prescribe, or remove the goods from an examination station unless the goods have first been duly entered in manner provided by these rules and produced to the proper officer of Customs and Excise and duly cleared by him.

12. No person shall remove from any aircraft any goods imported therein until the report required by rule 7 (above) has been made, and the authority of the proper officer of Customs and Excise has been obtained.

13. The importer of any goods imported in aircraft shall deliver to the collector of Customs and Excise in whose district the aerodrome of importation is situated an entry of such goods in accordance with the provisions of the Customs Act, and shall truly furnish thereon the several particulars required by the form of entry, and shall pay to such collector all duties chargeable thereon at the times and in the manner prescribed by the said Acts; provided that no entry shall be required in respect of diamonds or bullion or the baggage of passengers.

14. All goods imported into an appointed aerodrome in any aircraft shall be duly entered and unladen within seven days from the time of the arrival of such aircraft at that aerodrome or within such further period as the Commissioners may allow.

15. All goods imported in aircraft which have not been examined and cleared by the proper officer of Customs and Excise shall be stored in a transit shed at the appointed aerodrome, and no person shall remove such goods from the transit shed before examination and clearance by such officer.

Exportation of Goods

16. (1) The exporter of any goods intended for exportation in aircraft shall deliver to the proper officer of Customs and Excise at the appointed aerodrome from which such aircraft is cleared to its foreign destination, an entry in the form prescribed by the Commissioners, and shall truly state in such form the particulars hereby required; and such form when signed by the proper officer of Customs and Excise shall be the clearance and authority for the exportation of such goods.

(2) No person shall export goods on such aircraft until such authority has been given by the proper officer of Customs and Excise.

17. No person shall, without the consent of the proper officer of Customs and Excise, unload from any aircraft any goods loaded thereon for exportation which have been cleared under rule 16 above, or open, alter, or break any lock or mark or seal placed by any officer of Customs and Excise on any goods in any aircraft about to depart from the United Kingdom.

18. No person shall make any signal to or from an air-

craft entering or leaving the United Kingdom except such signals as are authorized by these regulations; provided that no offense shall be deemed to be committed under this rule if the person making such signal proves that the signal was not given for the purpose of evading or of assisting any person in evading these rules.

19. If any officer of Customs and Excise in the execution of his duty boards any aircraft in any place, the pilot thereof shall not convey him in the aircraft away from such place without his consent.

20. No dutiable goods shall be removed in aircraft from the Isle of Man to Great Britain or Ireland except from an appointed aerodrome and with the consent of the proper officer of Customs and Excise.

21. If any aircraft arriving from a place outside the United Kingdom shall land in any place other than an appointed aerodrome, the pilot shall forthwith report to an officer of Customs and Excise or police constable, and shall, on demand, produce to such officer or police constable the log books belonging to the aircraft, and shall not allow any goods to be unloaded therefrom without the consent of an officer of Customs and Excise or police constable. If such place of landing shall be an aerodrome the pilot shall forthwith report the arrival of the aircraft and the place whence it came to the proprietor of the aerodrome and the proprietor of the aerodrome shall forthwith report the arrival of aircraft to an officer of Customs and Excise, and shall not allow any goods to be unloaded therefrom or any passenger thereof to leave the aerodrome without the consent of such officer.

22. (1) The proprietor of any aerodrome shall at all times permit any officer of Customs and Excise to enter and inspect his aerodrome and all buildings and goods thereon.

(2) The pilot of any aircraft shall permit any officer of Customs and Excise at any time to board and inspect his aircraft and any goods laden thereon.

(3) The importer or exporter of any goods imported or exported in aircraft shall produce such goods to the proper officer of Customs and Excise at the aerodrome of importation or exportation, as the case may be, and permit him to inspect such goods.

23. Any provisions for the time being in force of the Aliens Restriction Order or of the Defence of the Realm Regulations with respect to persons arriving in or departing from the United Kingdom by sea, shall apply to persons arriving or departing by air as if the same were herein set out, with such modifications as are necessary for adapting them to such purpose, and in particular with the substitution of appointed aerodrome for the approved ports specified in the Aliens Restriction Order.

24. All persons importing or exporting or concerned in importing or exporting goods, mails, or passengers, into or from the United Kingdom in aircraft and all pilots of aircraft arriving in or departing from the United Kingdom shall observe and comply with the provisions of sections 53, 76, 102, 104, and 118 of the Customs Consolidation Act 1876, as if any references in such provisions to ships or vessels and the masters or captains thereof, and to the loading or unloading of goods thereon or therefrom, included references to aircraft and the pilots thereof, and to the loading or unloading of goods thereon or therefrom, and as if references in such provisions to a quay included a reference to an examination station.

AMENDMENT II

R. A. F. Aerodromes and Seaplane Stations

1. With reference to Regulation 4 (4), the dues to be charged at R. A. F. aerodromes are as follows:

A—Accommodation.

The charge for accommodation will be based on the floor

space occupied, *i.e.*, the product of span and overall length. With folder aircraft the span to be taken as the overall width when folded.

Charges will be as follows:*

	8 Hours or Less			Up to 24 Hours		
	£	s.	d.	£	s.	d.
Small type, less than 900 sq. ft.....	0	2	6	0	5	0
Medium type, not exceeding 1800 sq. ft..	0	5	0	0	10	0
Large type, over 1800 sq. ft.....	1	0	0	1	0	0

Monthly rates. Accommodation for monthly periods will be at rates of £5, £10 and £20, respectively. Any accommodation so reserved, but not made use of, to be available for hire to other aircraft. No refund to be made to the monthly lessee, unless he is thereby prevented from obtaining accommodation, in which case a proportionate refund will be made as in the opinion of the Secretary of State appears reasonable.

B—Landing Fees.

These will be in respect of the cost of maintenance of the aerodromes, use of landing lights and beacons and supply of navigational information.

The charges will include ordinary attendance, *e.g.*, guiding machines, starting propellers, re-fuelling, etc. For pushing machines with stopped engines any considerable distance charges will be made in accordance with 3 (a) below. At R. A. F. aerodromes where no attendance is available the charges will remain the same. The charges will be:

	For Single Landing			For books of 10 Coupons		
	£	s.	d.	£	s.	d.
Small type	0	2	6	1	0	0
Medium type	0	5	0	2	0	0
Large type	0	10	0	4	0	0

Each coupon to permit of one landing on any R. A. F. aerodrome for a period of 3 months from date of issue. Coupons to be transferable between aircraft, but not between owners.

No extra landing fee will be charged in respect of test flights before departure.

2. The R. A. F., its servants or agents, will not be liable for loss or damage by fire, flood, tempest, explosion, or other inevitable accident to aircraft or to the pilots, engineers, or other members of the crew thereof, or to any passengers, goods, or mails carried therein landing at or accommodated in any R. A. F. aerodrome.

3. (a) Attendance on civil aircraft by R. A. F. personnel other than the ordinary attendance included in the landing fees will be charged for on the basis of labor and time. Such R. A. F. personnel will be available to assist civil aircraft only to a limited extent, and at certain aerodromes to be specified by the Secretary of State.

(b) Stores, such as fuel, oil, tires, etc., and any standard spares that may be available, will be supplied to civil aircraft by the R. A. F. wherever possible, to meet emergency demands and when no other source of supply is available. Such supplies will be charged for at the current retail prices.

(c) Repairs will be carried out by the R. A. F. for civil aircraft on emergency when no other arrangements can be made. Repairs will be confined to such work as will enable the aircraft to proceed by air within a short period. No repair which will exceed a cost of £10, exclusive of the

*At present New York rate of exchange, the various amounts in British money quoted in the foregoing have the following approximate equivalents in U. S. currency.

s.	d.		£	s.	d.	
0	4	.....	\$0.07	0	5	..... \$1.08
1	0	.....	.21	0	10	..... 2.17
1	3	.....	.27	1	0	..... 4.33
1	6	.....	.33	2	0	..... 8.66
1	9	.....	.39	4	0	..... 17.32
2	6	.....	.54	5	0	..... 21.65

cost of stores and spares supplies, will be undertaken before an estimate has been made and submitted to the owner of the aircraft. Repairs carried out by the R. A. F. will be carried out to the satisfaction of the responsible inspecting officer, but no responsibility as to the unworthiness of the aircraft shall rest on the R. A. F. aerodrome staff.

(d) Where R. A. F. workshops are available but no R. A. F. personnel can be spared, arrangements will be made to permit the use of the workshops by civilian firms on appropriate terms.

(e) Subject to the exigencies of the service, salvage of aircraft will be undertaken by the R. A. F. inside R. A. F. aerodromes and as far as possible outside R. A. F. aerodromes. In both cases charges will be made according to the cost involved.

(f) Mechanical transport at R. A. F. aerodromes will be placed at the service of the civil firms on emergency, and when circumstances permit. The rates to be charged will be:

	Per Mile	
	s.	d.
5-ton lorry	1	9
3-ton lorry	1	6
30-cwt. lorry	1	3
Motor car	1	0
Motorcycle	0	4

These charges to include the driver, no vehicle being hired without an R. A. F. driver.

(g) Arrangements will be made for the use of aerodromes for purposes of tuition, exhibitions, or sporting contests. The charge will be in the form of a lump sum for the period for which the aerodrome is required.

The firm leasing an aerodrome for any such meeting shall be entitled to charge such entrance fees to spectators as they may desire. But they shall not charge more than the prescribed landing fees for aircraft landing during the meeting. Such landing fee shall remain the property of the firm holding the meeting.

Seaplane Stations

5. The arrangements and charges at R. A. F. seaplane stations will be, as far as practicable, similar to the above arrangements and charges at R. A. F. aerodromes.

AMENDMENT III

1. The proprietors of licensed aerodromes will be regularly supplied through the Air Ministry with the latest approved meteorological information, and will be responsible for exhibiting the same in a conspicuous place, and for supplying the same to pilots requiring it.

2. Proprietors of licensed aerodromes should, as far as possible, keep records of wind and weather.

3. Adequate first-aid appliances must be kept at all licensed aerodromes.

(Signed) WINSTON S. CHURCHILL,
Secretary of State for Air.

Some Criticism and Approval

It is not to be expected that any set of rules would please every one. That these rules do not please all Englishmen is made plain by the following comment received by AUTOMOTIVE INDUSTRIES from a correspondent who has long been identified with flying interests in the United Kingdom. We pass along the comment as interesting in connection with the rules themselves:

THE first and obvious objection to these regulations is that they announce that the Air Ministry is setting up in trade. State trading is always bad business.

Nevertheless there is no help for it. The airdromes are needed. They belong to the State. Aircraft owners cannot expect to have the use of them for nothing. So there is no way out of it except for the Air Ministry to set up as air-garage proprietors.

One can only hope that these State airdromes will be properly run and that the right people will be put in charge of them.

The Air Ministry cannot be expected to find a perfectly capable man to run each and every airdrome, but it is to be hoped that capable and experienced business men will be appointed as managers and not young and swelled-headed R. A. F. officers, nor dug-out, case-hardened sailors or soldiers who have gravitated down to the R. A. F. because their own services do not want them. There are, in fact, plenty of excellent men in the R. A. F. itself if the Controller-General of Civil Aviation will devote the necessary time and trouble to discovering them.

The garage fees do not strike one as being excessive, but they might well be reduced, and one fails to see why the landing fee for a small machine should be as high as the price for garage for 8 hours. A shilling should be quite enough for a mere landing, if the machine is left out on the ground and is not pushed into a shed.

If it is pushed into a shed, then 2s. 6d. is moderate enough. But when once it is there it costs nothing to the

State, so the 2s. 6d. ought to cover it for the whole 24 hours.

Though it is not specified, one assumes that "joy-rides" given to the pilot's friends after landing are reckoned as "test flights before departure" and so do not involve any further landing fees. But it would be well to have an official dictum on this.

The idea of charging extra for pushing machines long distances is excellent. This will teach haphazard pilots not to go and stop their engines away out at the other side of the airdrome, and will save the mechanics much sweat and swearing. From what one has seen of late, some of our war pilots really do need to learn a great deal about airdrome flying, and this is one thing that will help.

But who is to judge what is "any considerable distance"? Recollect that side-slip landings and such "stunts" are forbidden, and that machines must alight in the proper direction in the prescribed "landing zone." That may take them a more considerable distance from the sheds than if they were allowed to do an Immelmann turn and a side-slip in over the sheds. These things must all be taken into consideration.

Taking them all around, the regulations seem sufficiently reasonable in principle. The charges, on the whole, are less than those which would be made by ordinary airdrome or garage proprietors. It only remains to be seen whether the principles are properly handled in practice. And that depends entirely on the selection of the men who are placed in command of these civil airdromes.

POULAIN, a French cyclist, recently made a flight of 12 yards at a height of one yard by a man power aviette. Through reports of this flight Poulain has been accepted as a contestant for the Peugeot prize of 10,000 francs for the first 10 metre flight, the prize to be awarded by the Aero Club de France.

Unusual Types of Axles on the German War Trucks

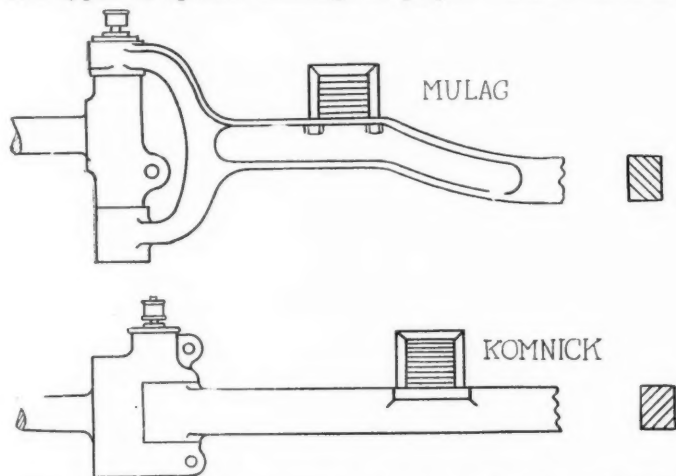
PART V

Diversity of practice lends much interest to this study of the axles of the German war trucks, which forms Col. Slade's contribution this week. There is not much about these axles described that reads like American practice. For instance, it is noted that no roller bearings are used. In this connection Col. Slade adds a few notes on other European practice on axle bearings, as noted in France.

By Lieut.-Col. Arthur J. Slade

THE front axles on the German trucks are about equally divided between the Elliot and reverse Elliot type, though a few vehicles were formed in which modifications of the conventional design of these types appear. Several sketches are shown illustrating typical constructions.

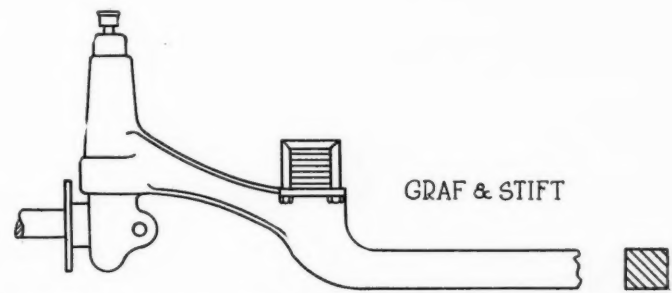
The axle bed is usually an I-beam section forging with integral spring pads. The steering knuckles were not removed in any case to determine in detail the construction and mounting, including design of knuckle bearings, but removal of the wheels disclosed the fact that there were two types of spindle bearings employed—bronze or other



alloy sleeves, usually provided with holes for retaining lubricant and annular ball bearings. No roller bearings of any type were encountered.

It would be of interest to know why the latter types of wheel bearings are apparently never used in European truck construction when their use is so general in vehicles produced by American manufacturers. The English trucks used in the A. E. F. were equipped with sleeve bearings and gave no trouble during the period of their use.

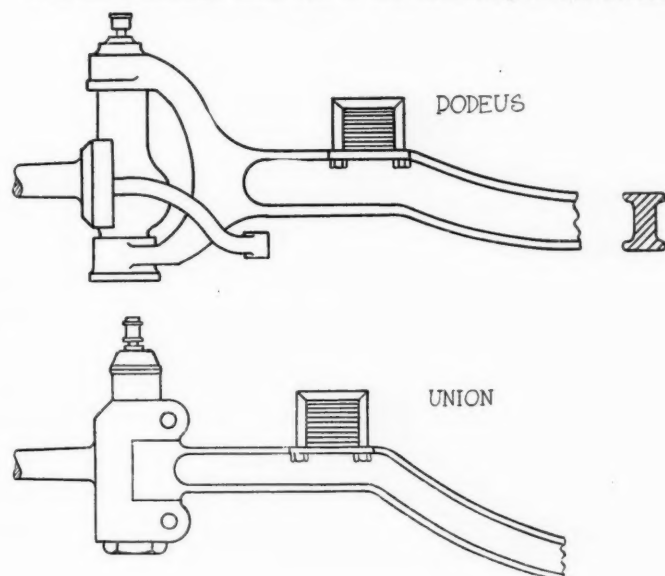
Technical officers of the British Mechanical Transport Service seem quite satisfied with this type of construction, but on account of lack of provision for adjustment due to wear the fit is examined periodically at inspections by rocking the wheels to discover when a predetermined limit of wear has been reached and the worn bearing sleeves are then replaced, the old bearings going to salvage to be

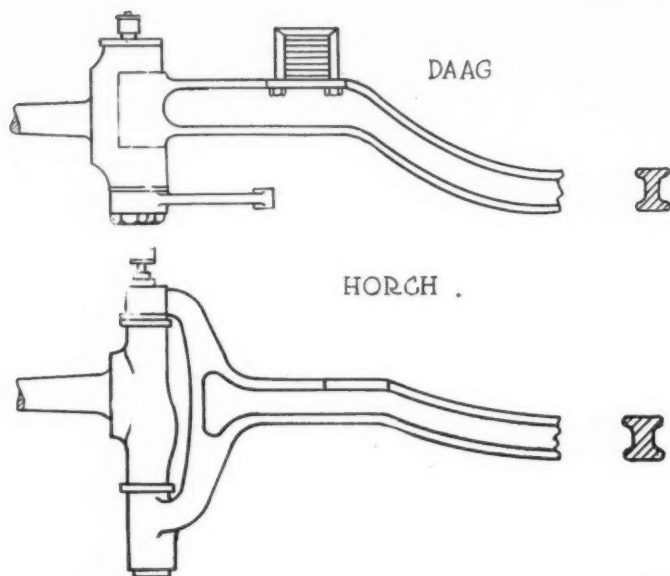


melted and recast. With this type, bearing wear may also occur on the axle spindle, and at one of the British reconstruction shops at Ponem, axles which had been in service several years and had worn down to an extent considered excessive, an electrolytic process was employed by which a thin surface of copper was deposited on the spindle and upon this steel was built up electrolytically to the normal dimensions.

This shop incidentally was operated by personnel composed of German prisoners under British foremen and very nice work of great variety requiring skilled mechanics was performed in an entirely satisfactory manner.

The ball bearings observed in the mounting of the wheels





on the German truck axle spindles, as elsewhere when they could be seen without extensive disassembling, were of the conventional single row annular type. These comments on bearings apply to the rear as well as the front axles.

The cross rods connecting the steering knuckle arms were generally without means for adjusting their length, the yoke ends being rigidly attached to the rod. In one case, the Daag 4½-ton, a rod was observed which was of forged I-beam section, with end yokes forged integral, though usually the rods were round bars or tubes. Either the axles themselves are made to very exact lengths or the rods are stretched or shrunk when the axles are assembled to insure accurate alignment of wheels. In the case of the Daag, the steering spindle arms are mounted with a serrated connection between them and the knuckle forging, this providing for alignment of wheels by adjustment of the arm on the steering knuckle.

As has been stated in a previous article, the preponderance of rear axles are built for chain drive. In some cases the spring pads are integral, in other cases separate spring seats are bolted on. There are several instances of rear axles forged with horizontal, longitudinal square openings, through which the springs are inserted and held in position. Typical of these is the Horch chain drive truck, of which a sketch is shown.

The Hering Axles

The Hering has a rear axle mounting its springs in a somewhat similar manner, as shown in sketch.

The mounting of the wheels on the axle spindles is provided for by machining the wheel hubs to receive the bearings in practically all cases when the wheels are made of cast steel, this type of wheel preponderating as is general in European practice. The rear wheel view of the N. A. G. shaft-driven truck illustrates the attachments used in these wheel mountings, using plain sleeve bearings, and the front view of the Opel 2-ton shows the fittings for ball bearing mounting.

In connection with the subject of steel wheels, it will be observed from the photos appearing in these articles that they are of a variety of forms and appear on the whole to have rather light spokes. It is not known what quality of material has been used, nor what its physical characteristics are. However, they are substantial and even without the relief from vibration through lack of rubber tires they apparently stand up to their work.

It was contended by German technical officers that wheel breakage was uncommon in their transport service, and no broken or cracked wheels were observed among the

trucks offered under the armistice terms nor among those found at their overhaul parks. Neither were the vast numbers of trucks encountered along the German lines of evacuation abandoned on account of wheel breakage.

A detailed study and comparison of design of the numerous types of German wheels in the truck collection with the American designs on the market, especially the design adopted by the War Department for the Q. M. Class B wheels, would be of definite value to steel wheel foundries and to truck designers and manufacturers interested in this type of wheel construction.

It was mentioned in a previous article that there is no standard track adopted for the wheels either front or rear, which, of course, must have made impossible the substitution of one axle for another on different makes of trucks. The possibility of making such substitutions in connection with operations in the field would be of distinct advantage where trucks built by a number of different manufacturers, but of the same general type, are employed.

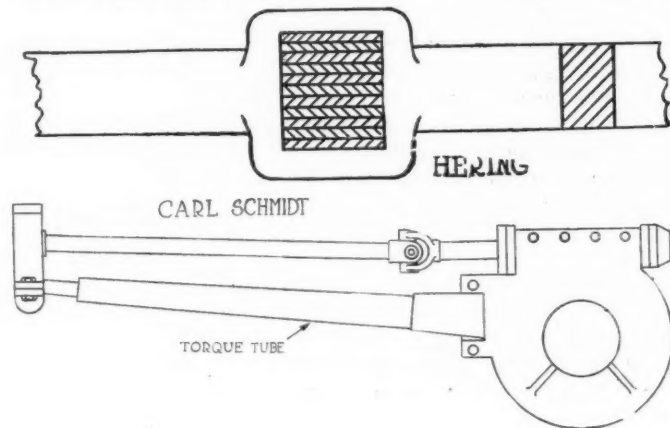
The rear axles of other than the chain drive type are of interest on account of their diversity, but as adequate facilities were not available at Coblenz for doing sufficient disassembling to make any thorough examinations, it had to be left for the investigations of the Bureau of Standards in co-operation with the engineering division of the Motor Transport Corps at Washington to disclose their features of construction. This work is proceeding, and it is expected that the results will be made known upon completion. The following descriptions give such data as were possible to obtain while the collection was being assembled.

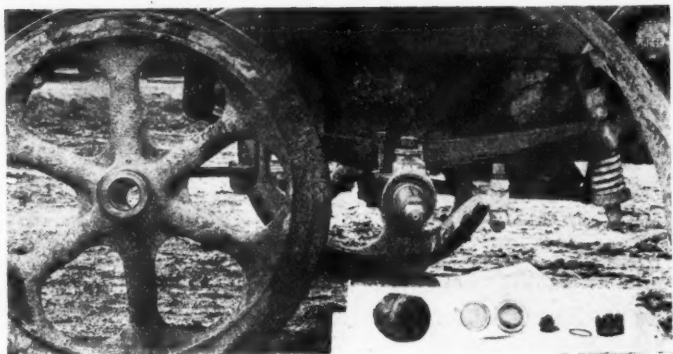
Carl Schmidt Only Worm-Drive Axle

The Carl Schmidt axle is the only one of the worm-drive type found among the German trucks. The shafts are in some way secured within the axle and could not be removed. The wheel load is carried on the axle housing by ball bearings, the inner being 3 5/32 in. inside and 6 11/16 in. outside diameter, the outer being 2 3/4 in. inside and 4 7/8 in. outside diameter. The wheels are held by right and left hand nuts, and the drive is through splined collars. Shaft diameter is 1 9/16 in. and the worm reduction is 10 to 1. A torque rod is mounted to the axle housing directly below the propeller shaft and held at the front end by a frame cross member. A double sprag is attached to the axle housing.

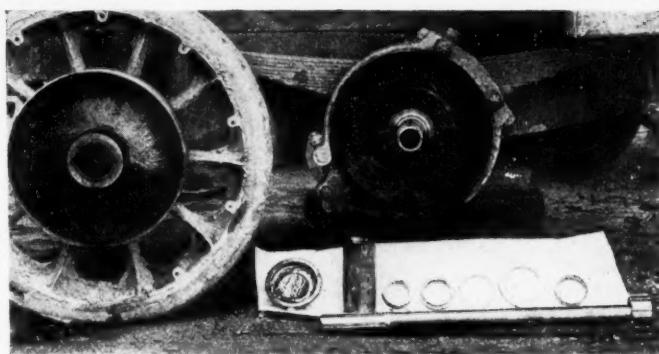
The Daimler internal gear-drive rear axle is familiar, as it has been manufactured in this country as well as having been imported. It is not known whether the Daimler in the collection differ materially from those produced in the U. S.

The Horch is in many respects the most interesting in the collection and has a rear axle of unusual construction. Just to the rear of the transmission is a large pressed steel cross member surrounding the foot brake and supporting a yoke supporting the forward end of the torque tube and

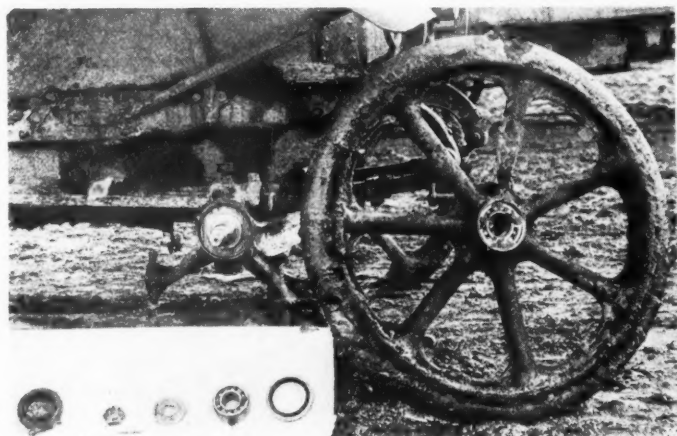




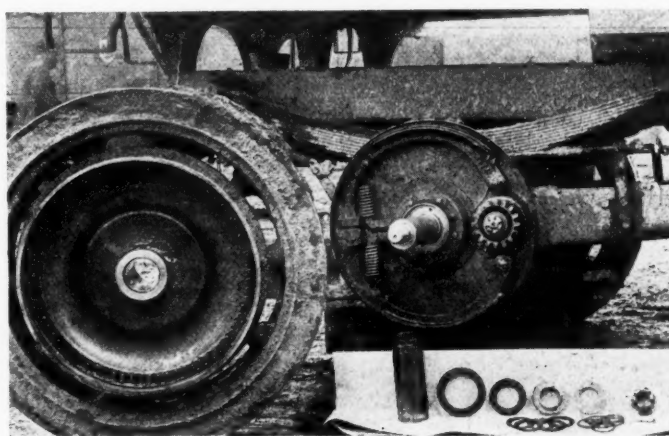
Front wheel of Daag



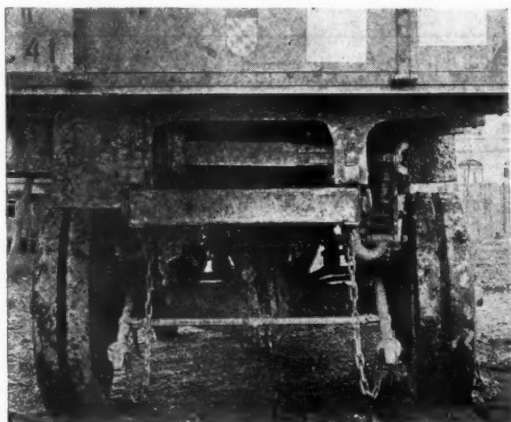
Rear axle assembly of Nationale



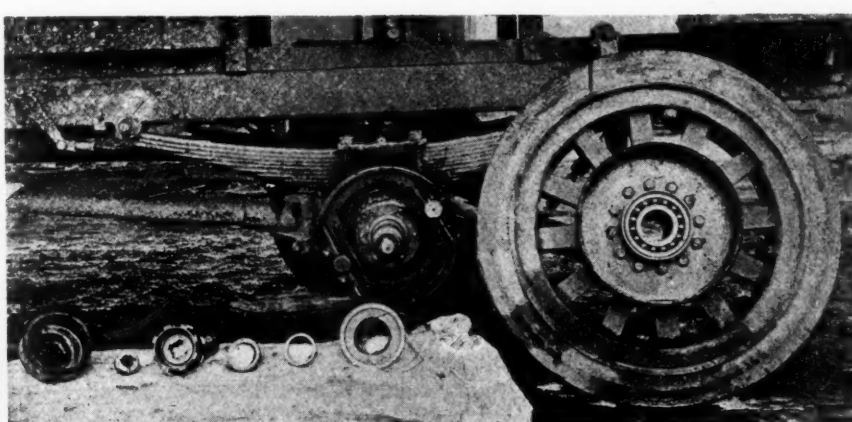
Front axle assembly of Opel



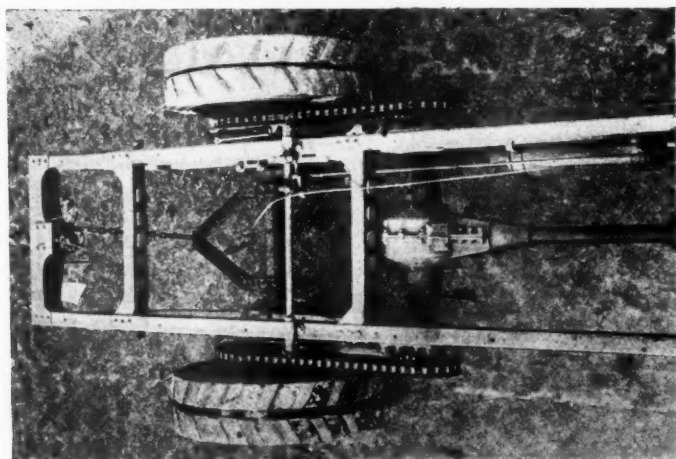
Rear axle of Daimler



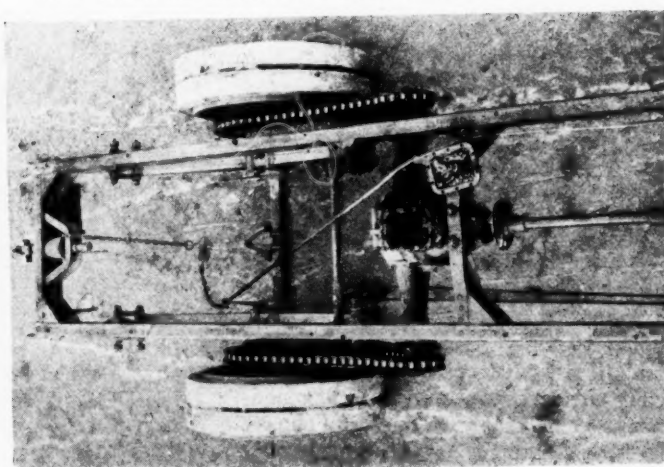
Rear view of Carl Schmidt truck



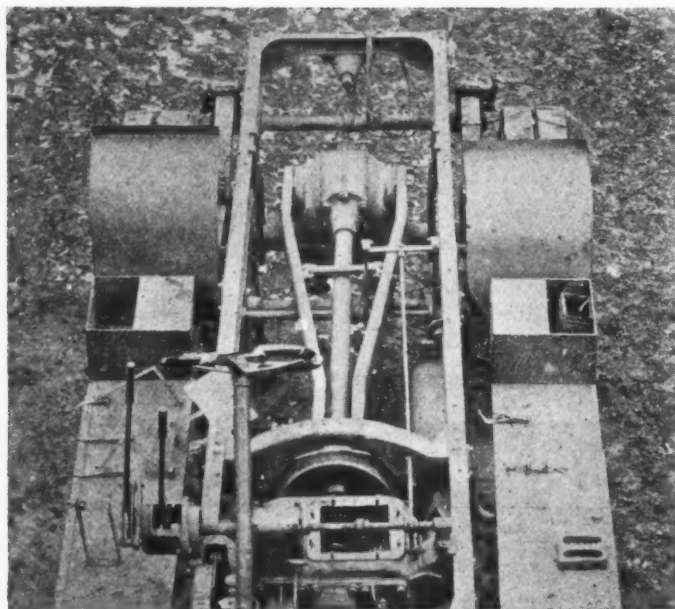
Rear wheel on the Carl Schmidt truck



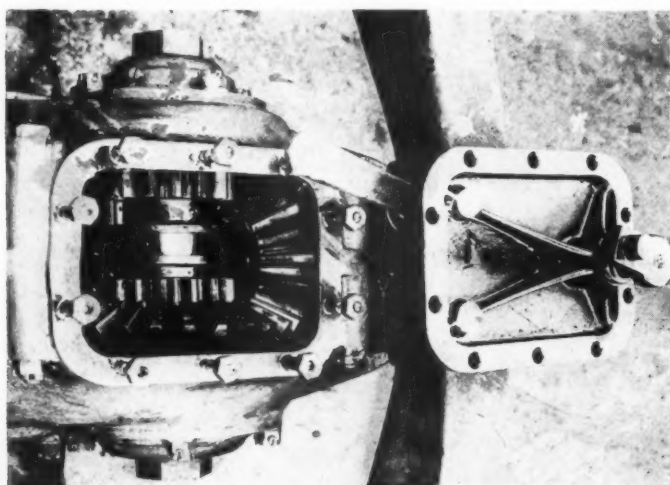
Top view of Stoewer rear axle



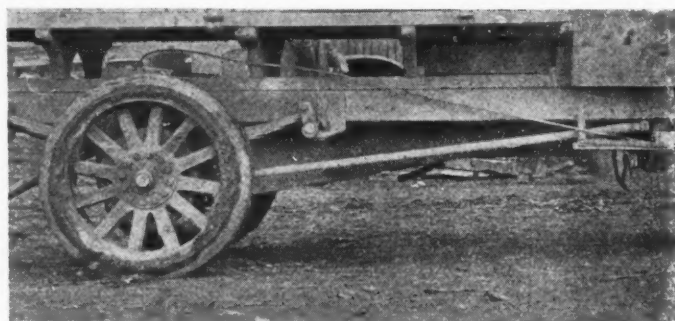
Jackshaft assembly of Dux



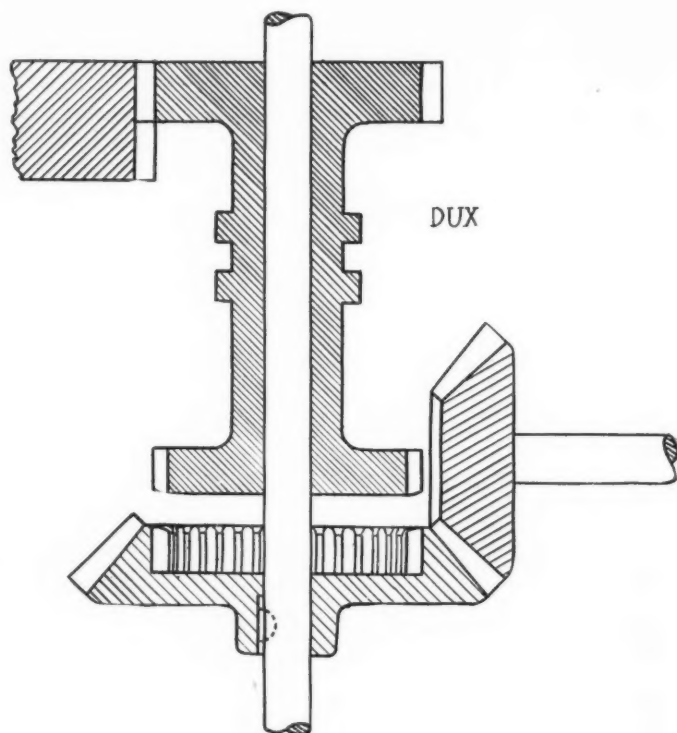
Rear axle construction of Horch



Top view of Dux jack shaft



Rear wheel of Presto truck



its braces. Within the yoke is a universal joint carrying the end of the propeller shaft. The axle is braced in several directions, all thrusts being taken through the yoke referred to. The propeller shaft drives the ring gear by a bevel pinion.

The differential is mounted within the ring gear upon a shaft, at whose ends are small spur pinions engaging spur gears beneath, which in turn are mounted on the axle shafts. The latter are carried in the axle tubes and are keyed to the rear wheels. Being secured in some unknown manner, the wheels then could not be pulled off or the shafts removed. In the perspective top view of chassis, the upper portion of the axle housing and a portion of its bracing can be seen.

The Presto is another shaft-drive truck having a double reduction rear axle. Here there are a torque arm in the center and radius rods of unusual length at each side. The axle housing is a casting with a heavy truss rod at the bottom. As this axle could not be conveniently opened, and it was not possible to pull the wheels off, the actual construction could only be imagined from the external appearance. The gear ratio of the axle was found to be 8 to 1, this being a 2-ton capacity vehicle.

On the Stoewer 3½-ton truck, the final drive of which is by chains, a first gear reduction is obtained by spur pinion

and gear within the transmission, the chain gear reduction being only 2.2 to 1, while the total high speed reduction is 14.5 to 1. Another Stoewer of 4½ tons capacity, of very similar construction but having a chain gear reduction of 3.5 to 1 and a total high speed reduction of 12 to 1, does not employ the transmission reduction. The final drive of the former of these two models is shown in the photograph.

The Dux, which has a final chain drive, employs a double reduction jack shaft, the chain reduction being 2.7 to 1, and the total high speed reduction 16 to 1. The photograph shows the entire final drive. This jack shaft also contains an internal and external gear clutch, inside the ring gear, which disengages the driving shaft from the jack shaft axles. The photograph and sketch illustrate the arrangement. The cover plate is shown removed and placed lower side up. The ring gear is mounted on a short shaft ahead of the jack shaft axles and has an internal gear cut inside.

A second shaft slides over the first, on which is cut a spur gear which engages the internal gear. At the opposite end of the sliding shaft is a heavy spur gear engaging a larger one on the line of the jack shaft axles. Between these two gears on the sliding shaft is a collar in which fits a shifting fork operated by a hand lever on the cover

plate of the case. The large spur gear on the line of the jack shaft axles carries the differential and the jack shaft axle ends.

When the hand shifting lever on the top of the case is moved in one direction, the internal and external ring gears are engaged in mesh, and the drive is from the bevel pinion to ring gear, through internal and external gear clutch to spur gear on ring gear shaft, to large spur gear on jack shaft axles, to sprockets and chains to rear wheels. When the hand lever is moved in the opposite direction, the sliding shaft withdraws the internal and external gears out of mesh, allowing the ring gear to run free of the drive to rear wheels, but still to drive the auxiliary shaft.

The purpose of this arrangement appears to be to provide for a power take-off having all the speed changes provided in the main transmission. All the shaft mountings are ball bearings.

It is such mechanical details as this and others which are being touched on in these articles, which might easily be overlooked in a superficial examination and could only be inspected somewhat cursorily in Germany while accumulating the trucks, that seem to make this collection worthy of thorough investigation. Admittedly there are crudities apparent in design and construction; perhaps American motor trucks are superior in all respects to any built in Europe; it may be that there is little to be learned from study of military vehicles used by our allies or the enemy. Certainly there is much to be learned from them on the subject of supply, operation and maintenance, lessons that we should have learned before our entry into the war, and it is not beyond the bounds of possibility that we may still have something to learn about the engineering features of military motor vehicles if we wish to be prepared for the next emergency.

Aircraft Engine Makers to Manufacture Motorcycles

By W. F. Bradley

PARIS, Aug. 8.

THE Gnome & Rhone Aviation Motor Co. is getting into production, at its Paris factory, on a new type of motorcycle for the French market. The machine, which is of English design, is known as the ABC, and is also built in England by the Sopwith Aviation Co. Gnome & Rhone will only build the motorcycle, the marketing being done by an independent company.

The ABC motorcycle is a distinct departure from previous European practice. The engine is a twin horizontal set across the frame, and having a cylindrical capacity of 400 cc.

Car practice is followed by the adoption of a single unit engine, clutch, gear box and countershaft, the drive being taken from the latter by chain. The cylinders are steel, machined all over, with detachable cast-iron heads in which are mounted two valves operated by overhead rockers. Pistons are aluminum. All oil is contained in

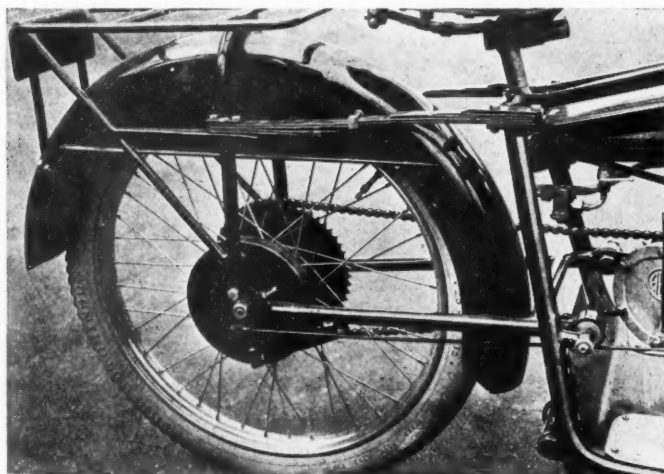
the base chamber, and is delivered to the main bearings under pressure. The magneto is mounted on the top of the base chamber, immediately beneath the gasoline tank, in a very protected position.

The clutch is disk type, Ferodo lined. Immediately behind this is a selective type three-speed gearbox, with car-type change speed lever. The entire unit is mounted on a broad cradle which also serves as foot rest. The forward face of this cradle is closed with sheet metal, with two openings for air to be directed on the cylinder heads.

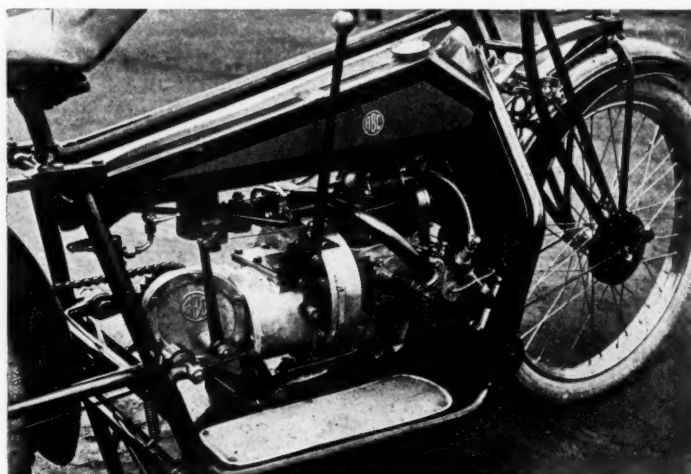
Suspension front and rear is by means of leaf springs. There is a brake on each wheel, both of them being enclosed internal expanding type within machined ribbed drums. Automobile and aviation practice are to be observed everywhere throughout the design and construction. Altogether the workmanship is of a very much higher quality than has usually been associated with French motorcycles.



This is the Gnome & Rhone motorcycle



The rear suspension



Unit construction of engine, clutch and gearbox

Three Designs of LM Double Reduction Truck Axle

The program of this new axle company is novel in several particulars. It is the first to offer axles of this type in the components market and the first to use Lynite in the manufacture of an axle offered to the trade. Leo Melanowski, the designer, has had wide experience in both this country and France.

DDOUBLE reduction axles have not been very prominent in the American commercial vehicle industry so far, though one of our best-known makes of small trucks has been using them from the beginning. In England, on the other hand, there are quite a number of trucks with double reduction axles, and trucks of this kind rendered efficient service during the war.

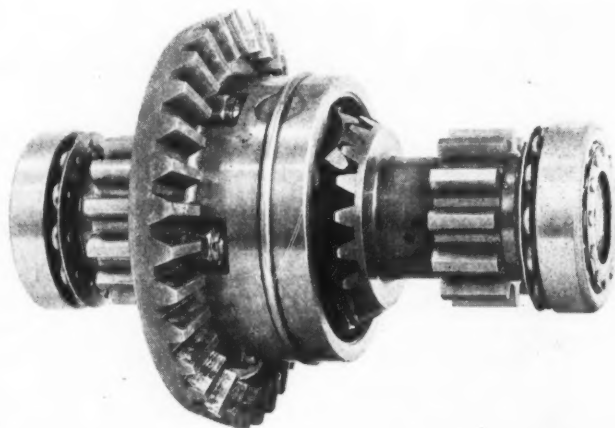
Hitherto, there has not been an axle of this type on the American components market, but this deficiency has been remedied, as the recently organized LM Axle Co. is preparing to manufacture in quantities double reduction axles for trucks of from $\frac{1}{2}$ to 5 tons capacity. These axles are the design of Leo Melanowski, who gained his early engineering experience in France, and who since coming to this country, 21 years ago, has been connected in various technical capacities with important automobile manufacturers and has twice returned to France for special work there.

Three designs are offered, of which one is recommended particularly for light work, up to and including $1\frac{1}{2}$ tons capacity, though, if desired, it will be made in capacities up to 5 tons. The other two designs are to be made in sizes of 2 to 5 tons.

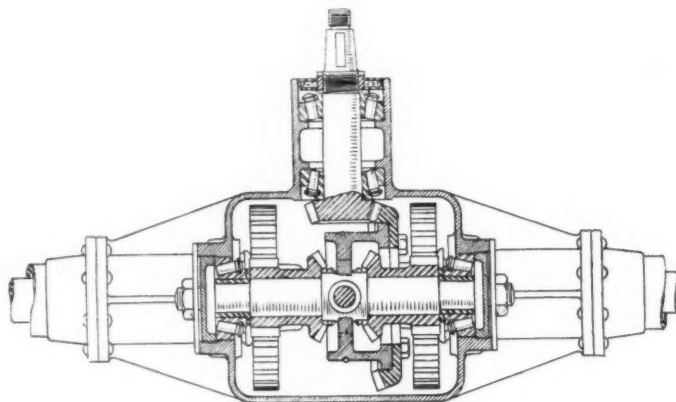
The Small Type

In the small axle, No. 8, the first reduction is through bevel gears, and the second through spur gears, the differential gear being located on the countershaft, which also carries the spur pinions. It is claimed for this axle that it is simple in construction and efficient in operation, and that the lubrication is thoroughly dependable. Two sectional views of the axle, as well as two photographs, are shown here, so the reader may judge for himself as to the claim regarding simplicity.

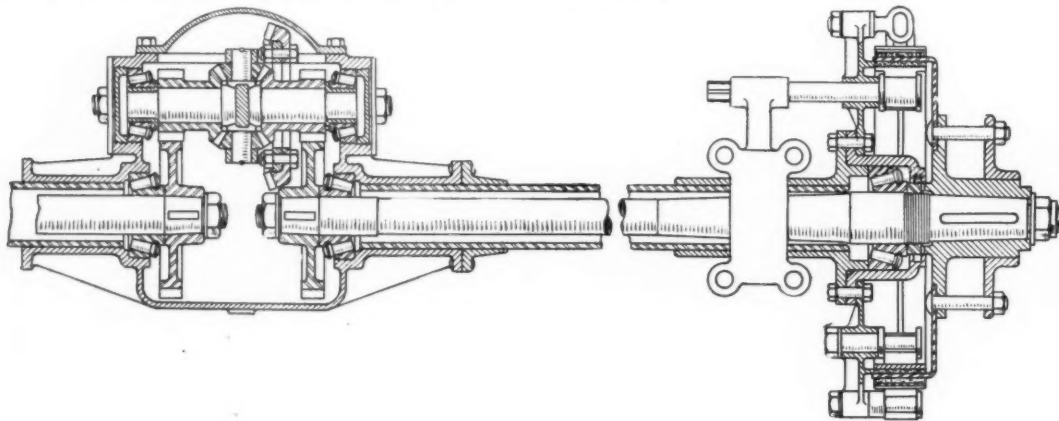
The differential spider or housing is formed integral with the countershaft, upon opposite ends of which are mounted the combination differential side gears and spur pinions. Forming the bevel driving pinion integral with



Differential and spur pinion of No. 8 axle



Differential and first reduction gears of No. 8 axle



No. 8 axle for light trucks

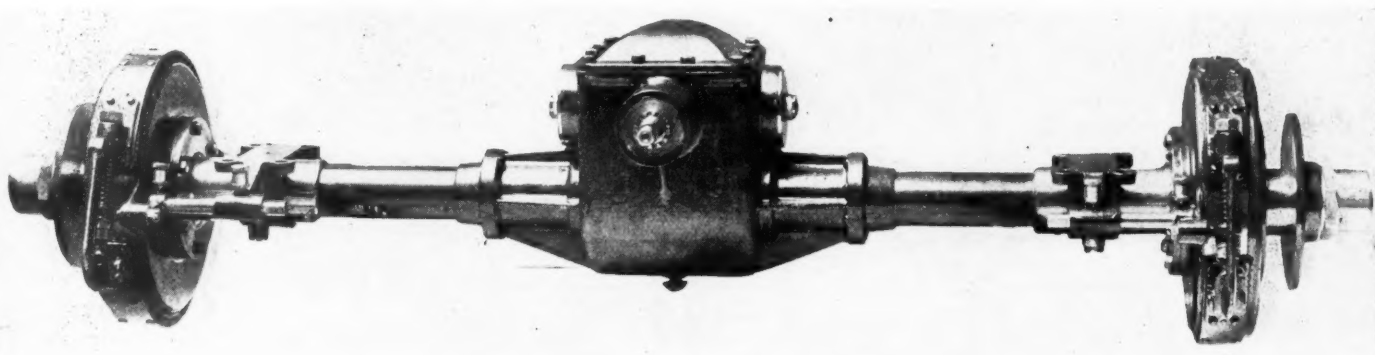
its shaft, the differential housing integral with the countershaft, and the spur pinions integral with the differential side gears, reduces the amount of machine work required in the manufacture of the axle and the chances of parts coming loose in operation.

The bevel ring gear is secured to the differential housing in the usual way. Both ends of the countershaft are reduced in diameter, and carry steel bushings with large diameter flanges, which are pressed against shoulders on

the shaft, thus insuring free movement of the differential gears. The final reduction is by spur gears, a large gear being keyed to the inner end of each axle shaft.

With this design the differential gear rotates at considerable speed, hence the torque to which it is subjected is small and its parts can be made light. Also, all end thrust due to the bevel gear comes on the countershaft, and is therefore comparatively light. The differential and first reduction gear with roller bearings can be quickly as-

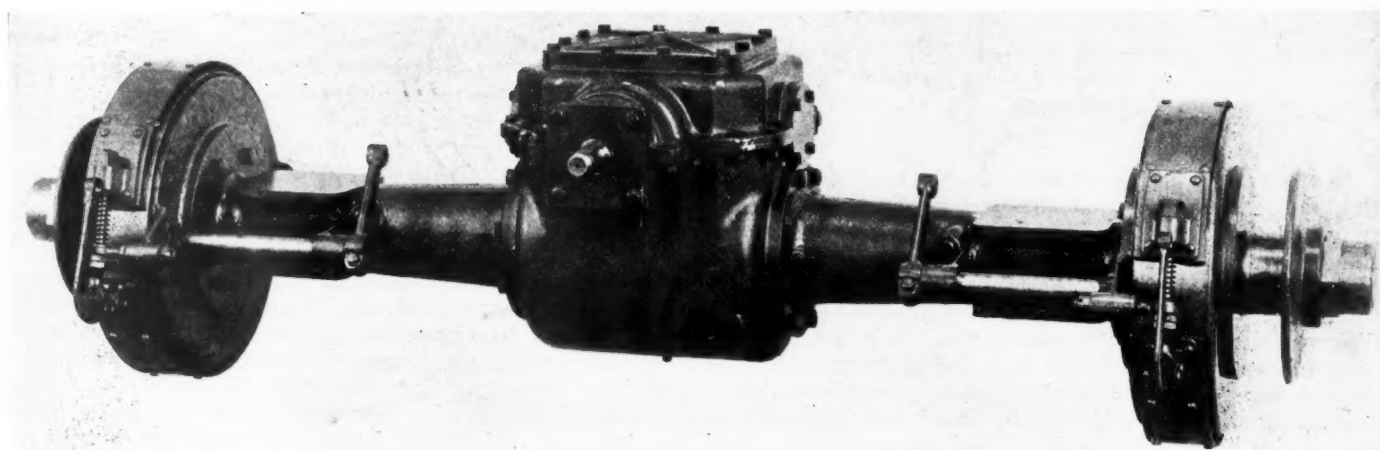
Three Types of LM Reduction Truck Axles



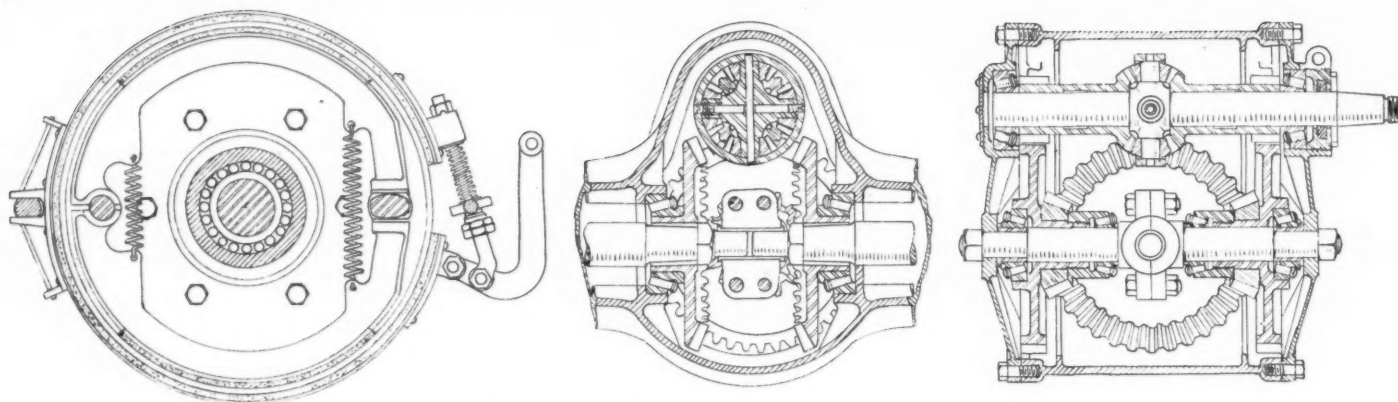
No. 8 axle for light trucks; weight 245 lb.



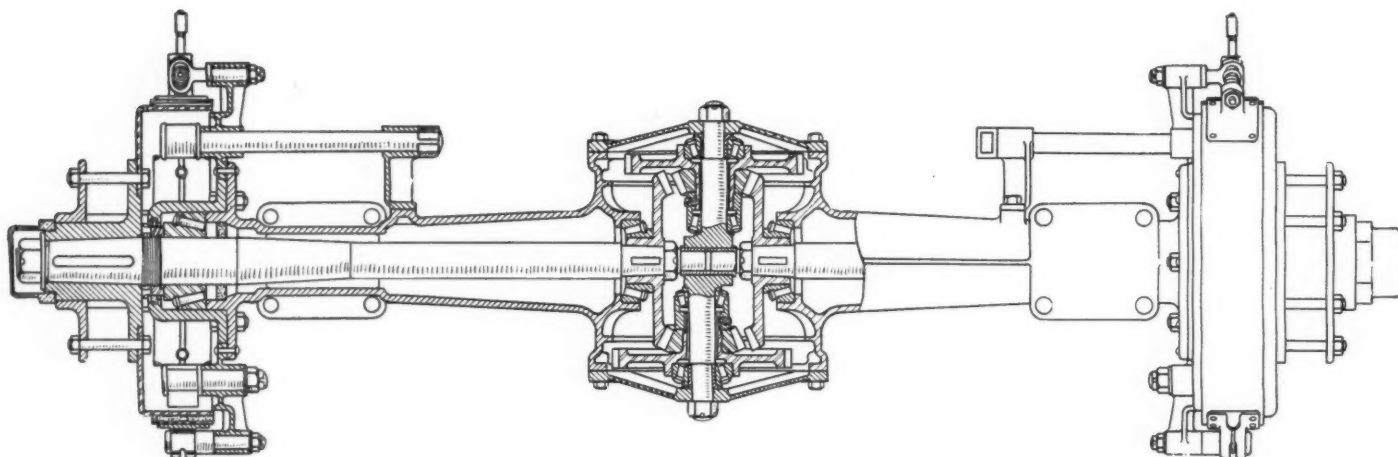
No. 7 axle with wheels; weight 495 lb.



No. 5 axle, Lynite housing; weight 504 lb.



Brake and reduction gears of No. 7 axle



No. 7 axle partly in section

sembled or taken apart. The differential gear is of the two-pinion type, the pinions being held by a wire ring.

The housing of this axle is built up of malleable castings and steel tubing. The axle is of the semi-floating type, and is fitted with roller bearings throughout. A pressed steel brake drum is held to the wheel hub by means of the regular hub bolts, and both internal and external brakes act on this drum. The central housing is substantially ribbed, and is provided with hub extensions, into which are fitted the inner ends of the steel axle tubes. These hub extensions have an annular flange at their ends, which are faced off and have short flanged hubs riveted to them, these hubs being tapered and running out to a relatively thin edge, the object evidently being to prevent localization of stress in the tubes.

This design of axle can be made with reduction ratios varying all the way from 5 to 1 to 16 to 1. The $\frac{3}{4}$ -ton axle, with brakes, weighs 245 lb.

The Second Design

In the second design of axle, No. 7, the usual order of things is reversed in that the first reduction is through spur and the second through bevel gears. In this design the differential is carried on a shaft forming an extension of the propeller shaft, and therefore located at right angles to the rear axle. Formed integral with the hub of each differential side gear is a spur pinion, and each of these pinions meshes with a large diameter spur gear, the two gears being mounted to revolve on a pair of offset spindles parallel to the differential shaft. Each of the two large spur gears is provided with a bevel pinion solidly keyed to its hub, the assembly of spur gear and bevel pinion being mounted upon conical roller bearings. Each of the

two bevel pinions meshes with a bevel gear on one of the axle shafts, interference being obviated by the offsetting of the spindles. This axle has a Lynite aluminum alloy axle housing, and is of the semi-floating type.

A 2-ton axle of this type, as illustrated, with pneumatically tired wheels, weighs only 495 lb. Spring pads are cast integral with all of the axle housings, and the latter are apparently designed for the Hotchkiss drive. The No. 7 axle just described is claimed to be the lightest axle for this size of truck ever produced.

The differential gear used in this design is of the four-pinion type, and the bore of the housing for inserting the differential is $3\frac{1}{4}$ in. in diameter.

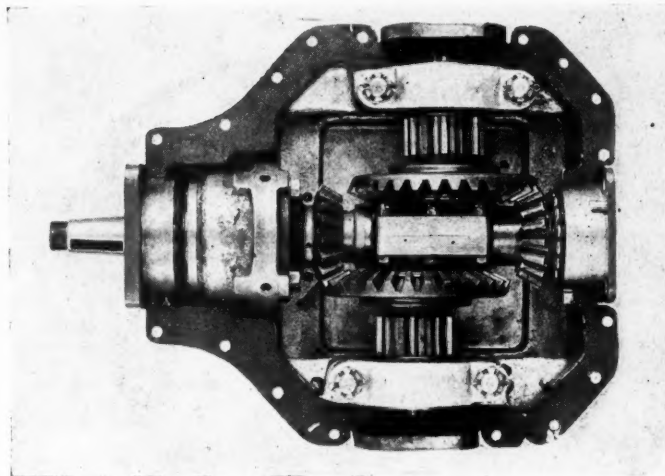
The Third Design

In the third design of axle, No. 5, the differential gear is placed on a shaft driven directly from the propeller shaft through the rear universal joint. The housing of the differential is riveted to a flange on this driving shaft. Of the two side gears of the differential, one is secured to a shaft concentric with the driving shaft by means of splines, and the other is formed integral with a second bevel gear, this double gear being free on the last-mentioned shaft.

The shaft has formed integral with it a bevel gear located to the rear of the axle. Upon the shaft between the integral and free bevel gears is carried a sleeve, with two spindles extending from it in opposite directions, but slightly offset one from the other. Upon each of these spindles is mounted a combination bevel gear and spur pinion, and each of the bevel gears is in mesh with one of the bevel pinions, which are in direct driving relation with the two differential side gears.

The two spur pinions mesh with spur gears at the inner end of the rear axle shaft, these spur gear combinations forming the final reduction. Thus, in this design, the differential gear comes first, then the bevel gear reduction, which is in duplicate, and finally the spur gear reduction, which is also in duplicate. While most of the bearings in this design are also of the roller type, annular ball bearings are used inside the two large bevel gears, probably owing to limitations of space.

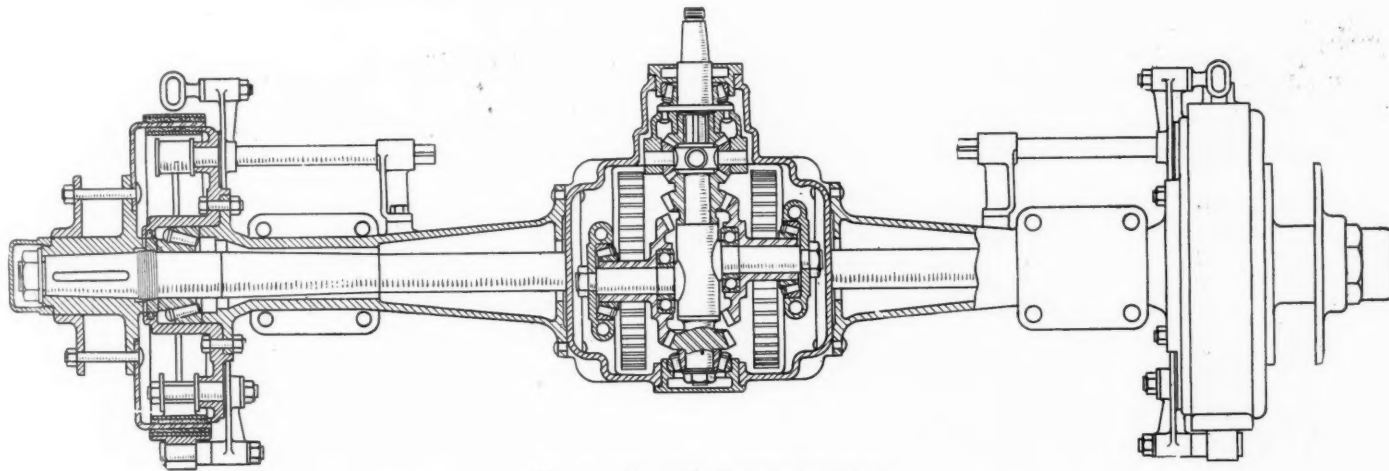
The axle housing of this design is also made of Lynite, and the 3-ton axle complete weighs only 504 lb. As will be seen from the photograph, the central housing is split in a horizontal plane through the axis of the counter-



Driving gears of No. 5 axle

shaft, and there is a large size hand hole with cover plate on top. This axle, too, is of the semi-floating type, and is fitted with roller bearings at the hub. Combination internal and external brakes are fitted to the driving wheels, and provision is made to prevent lubricant working out of the axle and getting on to the brake. The brake carriers are made of malleable iron, are piloted on the end of the Lynite housing and bolted to a large flange.

All axles are of workmanlike design, and in the two types with Lynite housings the ribbing is internal, thus giving a smooth outside form which is easy to keep clean. All are designed for the Hotchkiss drive, having integral spring pads on the Lynite housings.



No. 5 axle with Lynite housing

Aircraft Influence on Engines

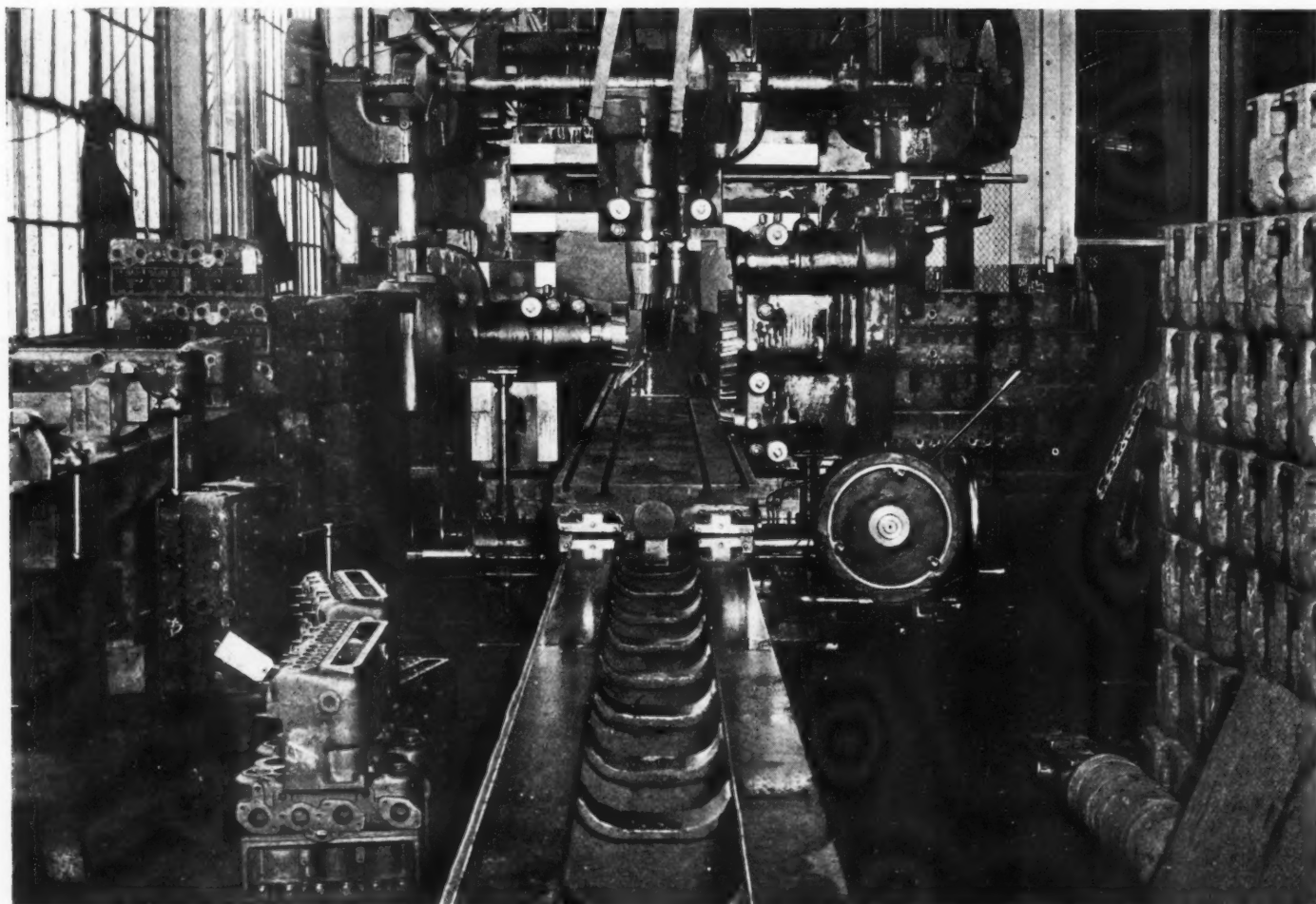
EXPERIENCE gained in connection with aircraft engines will have an important influence on future automobile engine design, writes Charles Faroux in *La Vie Automobile*. "I am convinced," he says, "that we shall see the overhead camshaft type of engine become popular on the regular touring car, as well as on the speedster. This arrangement of the valves is the most rational from every point of view, and the objections which could be raised against it at the start are no longer valid. There are some very nice constructions, and some of these have already been described. Hemispherical combustion chambers also have a great future before them, and are destined to become the standard construction."

"The remarkable increase in mean effective pressure will also become evident in touring vehicle motors, and the specific output will increase proportionally. In the approaching races, we will see the output of 30 hp. per liter (61 cu. in.), where we left off in 1914, improved upon, as well as speeds of 3000 r.p.m. Touring vehicle motors will follow the same ascending path, and will exceed 20 hp. per liter."

Testing Hardness Magnetically

A BRITISH firm has developed an apparatus for testing the physical qualities of steel after heat treatment by means of the magnetic method. The principle on which this instrument is based is that the magnetic retentivity of a steel is a function of its hardness.

The method of using this apparatus is as follows: First a specimen (usually a turned piece 3 in. long by $\frac{1}{2}$ in. diameter) is subjected to the heat treatment required to be investigated. It is then tested for magnetic hardness by being laid inside a standard magnetizing coil, and a direct current from the mains flashed on to the coil, which magnetizes the steel to saturation. The specimen is then removed from the magnetizing coil and is placed in a small search coil, which is directly connected to a Grassot fluxmeter. The specimen is then sharply removed from the ballistic coil and a reading is obtained on the fluxmeter, which represents the hardness of the specimen. The scale of the fluxmeter is divided in terms of Maxwell-turns. With the search coil of correct design, the reading is also given in terms of C. G. S. units of coercive force, so that the results are in international units.



Upper picture—Crankcase castings passing from the preliminary milling operation direct to roller conveyor—good practice
Lower picture—Cylinder castings piled on floor and lifted to machine table and lowered to floor—poor practice

The Economical Employment of Gravity Conveyors

No production plan of to-day is complete unless the subject of conveyors has been given thorough study. The economy of a system which, once installed, involves no further expense or worry is obvious. It is true that the installation of such a system is individual to each plant, but there are general facts and specific applications of the system which will be helpful to any one studying his own problem.

By J. Edward Schipper

IN up-to-date machine shops the transportation of parts from one machine to the next is accomplished almost wholly by means of the roller or gravity conveyor. This type of conveyor, which is on about the same level as the table of the machine, has proven so convenient that its use is being extended rapidly and it is even replacing trucking methods in a great many instances where hauls are all in one direction.

The roller system, particularly, is so elastic that its possible uses are numerous, not only in our industry, but in a great many others. This easy method of moving bulky and heavy parts has practically revolutionized transportation between machines and between departments. Wherever the parts have to be passed from one man to the next in manufacture, whether they are large or small, heavy or light; wherever the products must go from machine to machine at a uniform, continuous rate, or where they have to be carried a distance of from 5 to 1000 ft. in order to get from one machine or department to another, or one phase of manufacture to another, the gravity conveyor should have consideration.

With small production the parts can be moved on wheeled stands or racks, but as soon as the production attains considerable magnitude, or if the building is restricted to any degree, the racks must be displaced by the roller conveyor or some other mechanical system.

Under the old system it is necessary to have as many trucks as there are units in process. As soon as work on the unit mounted on these wheeled trucks is completed the truck must be brought back empty. This consumes time and often leads to confusion, unless there are set rules as to the exact time and place that the wheeled trucks should be moved. With the roller type of conveyor, on the other hand, the parts can be moved continuously, and any reasonable variations in the rate of output do not make the least difference.

Roller Conveyors Used in Big Factories

Motor car, truck and tractor factories of considerable output are practically all using roller conveyors in the departments devoted to the manufacture of engines and chassis parts, and mechanical conveyors, such as the chain system for the chassis and body assembly departments. This makes a logical layout, as the operations along the assembly line are fixed, the parts are large and the chain system enables the stations for the different crews of men to be laid out without trouble.

On the other hand, in the manufacturing departments,

where the conveyor system must be adapted to the machine location rather than the operations being adapted to the conveyor, the roller or gravity system can be used to great advantage. It is possible by its use to bring the parts to any location, as curves can be turned and parts can be raised or lowered, either manually by pushing or, if the parts are heavy, by simple mechanical installations.

Furthermore, the feed of the parts to the machine is absolutely at the will of the operator. He can take the part off the roller and put it on his machine when he needs it, and push it along its way as soon as he has completed his work. Mechanical conveyors for this type of work have one basic objection, which almost precludes their use for manufacture. One slow operator, or one broken down machine temporarily stopping one operation, holds up the entire line, because it is necessary to stop the conveyor.

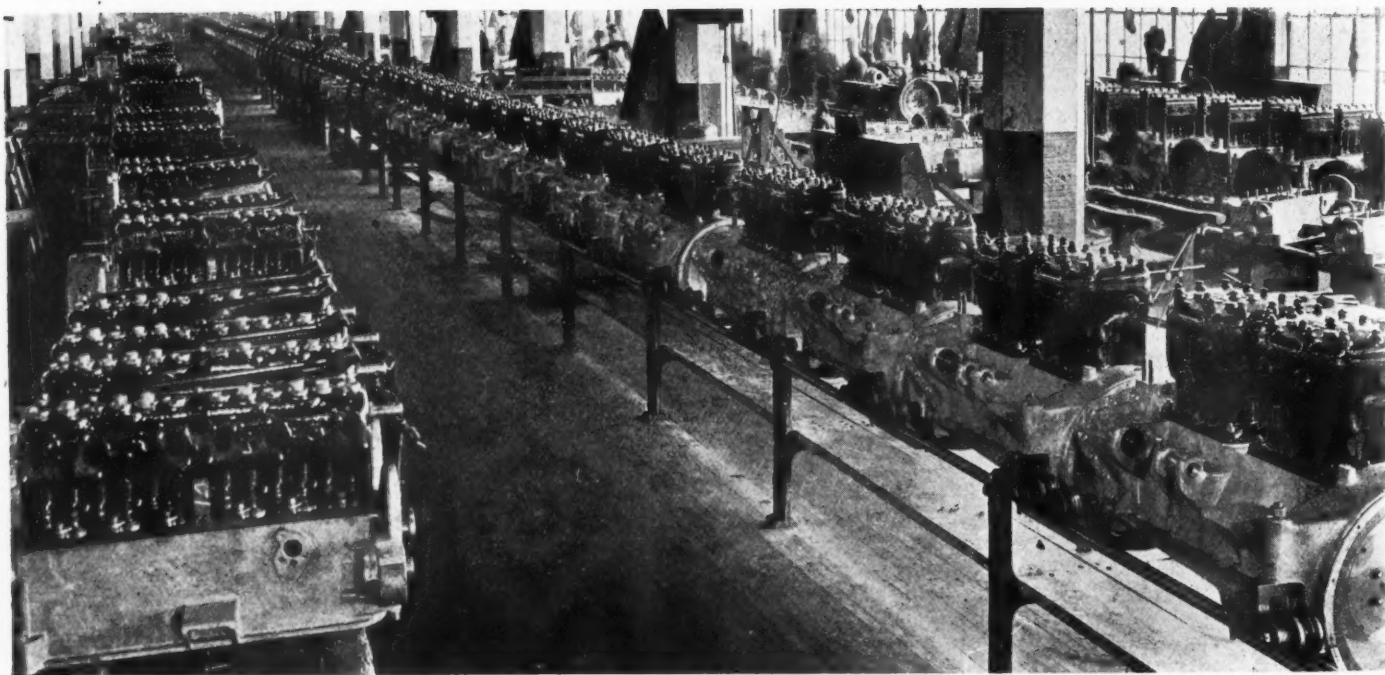
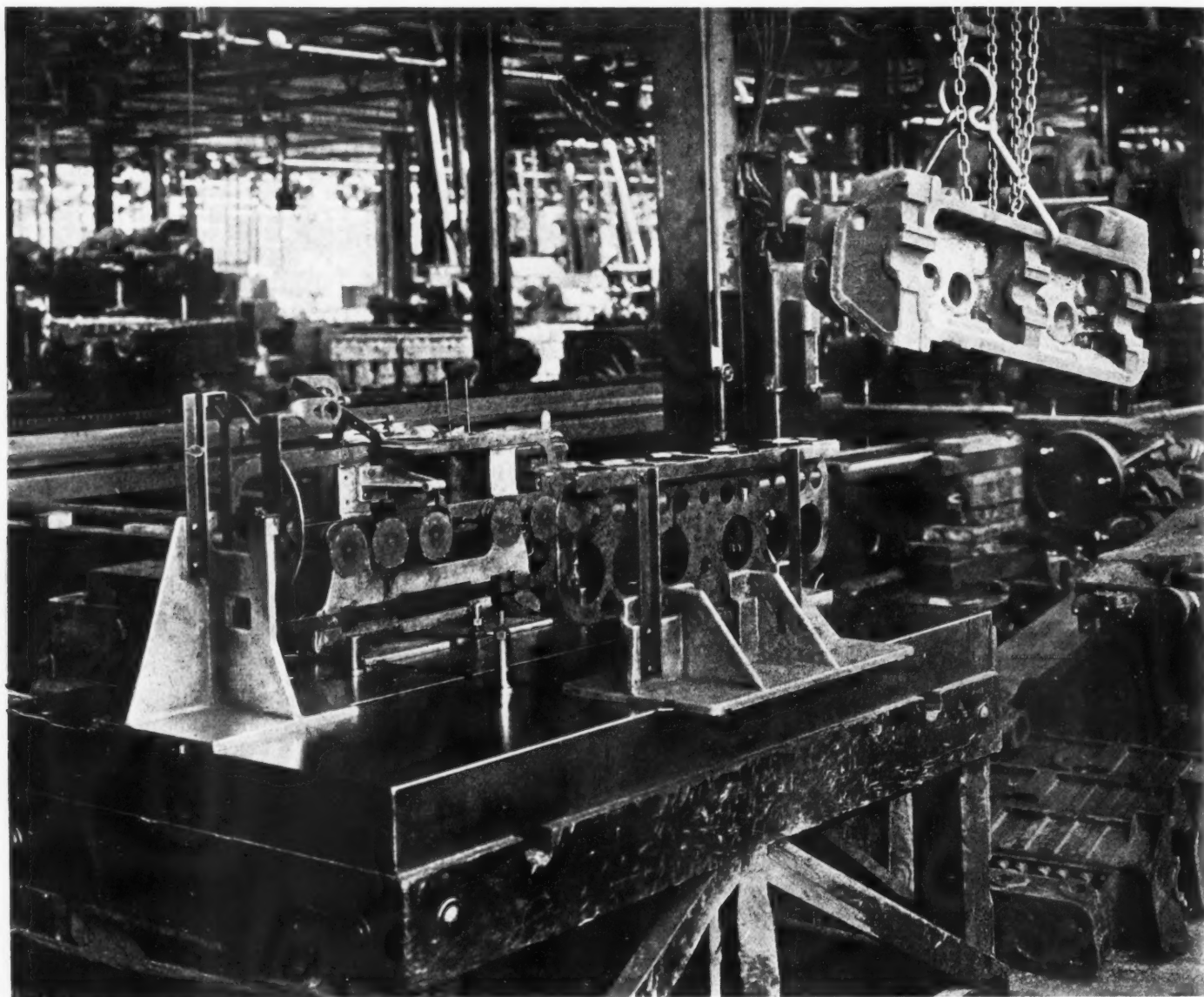
On the other hand, with the gravity conveyor, a stop on one machine holds up only the operations beyond that point, whereas the operations ahead of it can proceed without delay.

Problem of Roller Conveyor Installation

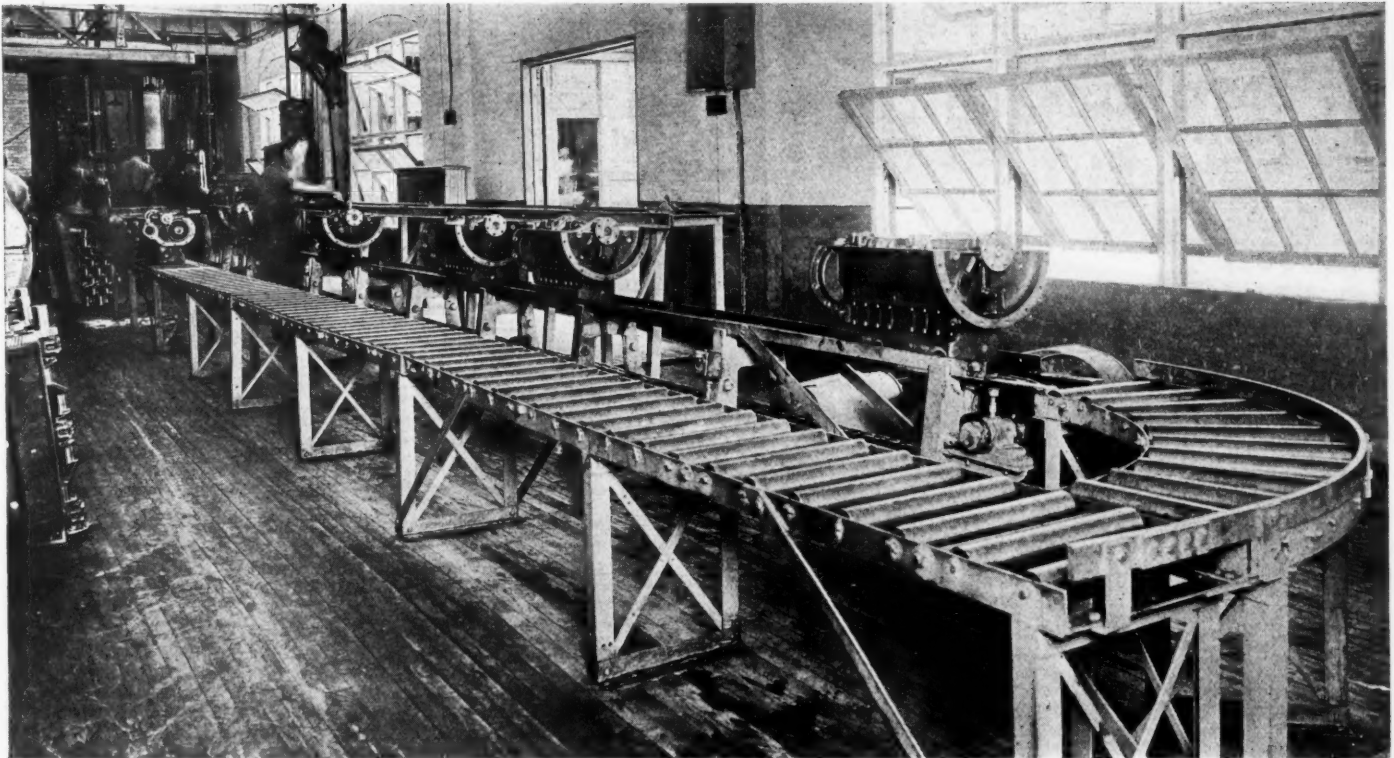
The problem as to when it pays to install a roller conveyor system must be solved for each individual case. In the standard systems now on the market each roller is capable of sustaining about 200 lb. As it is practically necessary, in order to get full operation, that the load be distributed over three rollers, the normal maximum load on a conveyor system of standard type would be 600 lb. Greater capacities than this can, of course, be obtained, but only at additional cost.

If the parts to be moved are relatively bulky, the total weight can be greater than the limit mentioned, as the load is distributed over a greater number of 200-lb. rolls. The consensus of opinion among factory managers seems to be that a man should not be required to lift more than 40 lb. at a time, and that if he has to do this, the number of times he does it should be limited. The fatigue factor is very high. For instance, if a man were to lift 40 lb. a height of 2 ft. on a production schedule of one per minute, he would, at the end of an hour, have done 4800 ft. lb. In other words, in his lifting operations alone he would have done as much work as is required to lift a ton through 2 ft. This is just as much work as that required in shoveling a ton of coal out of one bin into another 2 ft. higher, and the workman must do this in addition to his regular productive activities in handling a machine.

There are a great many automobile engine plants in



Upper picture—Contrast this older method of an overhead block and fall for raising parts from the floor with lower picture, showing engine being moved by man power on level roller track—good practice



Cylinder castings leaving mechanical chain conveyor and entering gravity system without attention of operator

which a conveyor system could save labor. Generally, the first operations in engine manufacture are rough milling the crankcases and cylinder blocks. An average block for a six-cylinder engine weighs approximately 125 lb.

It is very common practice to take these big castings from the milling machine tables and place them on the floor, then lift them by an overhead trolley and convey them to the finish milling machine, after which they are again put on the floor and lifted by crane or trolley to the roller system which may carry them along through the rest of the machining operations.

It is quite easy to improve upon this plan by having a roller conveyor placed at the height of the milling machine table so as to make it possible to slip the casting off the table at the end of its travel to the roller conveyor, then allow it to go on its way to the table of the next machine, without having the double operation of piling the castings on the floor and lifting them again to the desired height.

One of the places in a factory where much manual handling is generally done is in the salvage department. When the pieces reach the inspector, after having passed along through the series of machines, he will always have a certain percentage of rejections. These rejections, as a rule, find their way into the salvage department, and generally reach that department by trucking. It is rarely that the salvage department is adjacent to the regular manufacturing department, and hand trucking is often resorted to.

This has proven to be an inefficient procedure. In one axle factory it costs five cents to move each rejected axle housing from the production inspection to the salvage department. The reasons for this high cost is that the man who handles the truck often has nothing to do; he must walk back with his truck empty and then he has to spend time finding just what part of the salvage room the rejected part must go to.

Contrast this with a system by which the inspector is located at a station along the roller conveyor with a mechanism to stop the progress of the parts as they reach him. By means of a handy switch he transfers rejected

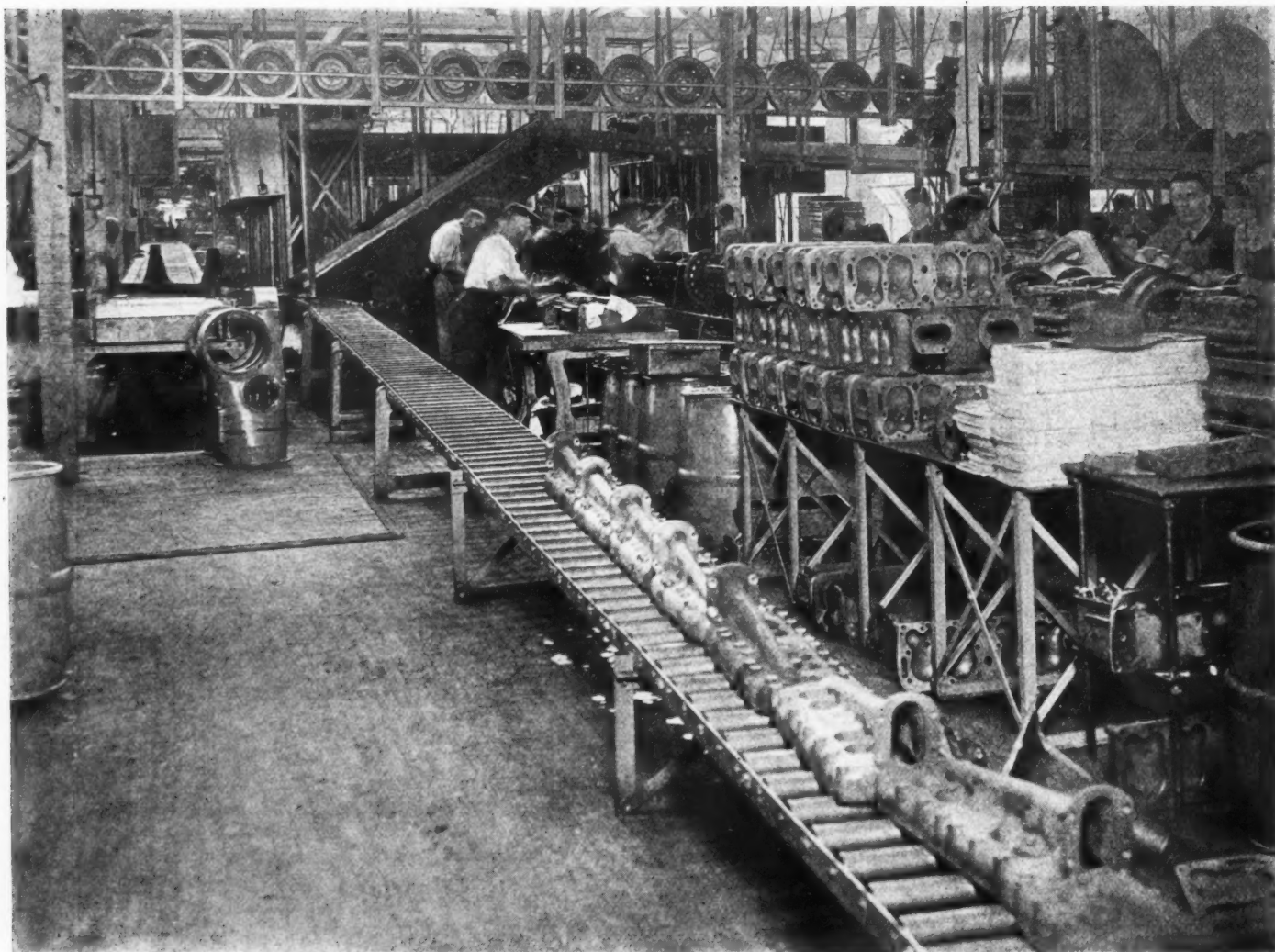
parts to the gravity conveyor running to the salvage department. If an hour passes by without a part being rejected, there is no man to run out of work and there are no empty trucks awaiting a call. The rejected part is simply switched over to the conveyor, given a slight push to start it on its way, and it runs by gravity to the checker in the salvage department, who forwards it on the roller conveyor to the required location.

There is no reason why several lines of conveyor rollers cannot converge at the salvage department, with the result that all manufacturing departments which are apt to have "rejects" can feed directly into salvage, thus eliminating a very wasteful trucking procedure, due to its non-continuous nature.

The question often arises as to just how long a gravity conveyor system can be made and still be effective, as compared with a mechanical system. This, of course, depends upon the nature of the product to a very large extent, but with a slope of $\frac{1}{4}$ in. or more to the foot practically all hard metal surfaces will travel under their own weight. This slope can be increased if necessary, and if the line is of such length that the level drops too low, mechanical boosters and elevators can be installed which again raise the product to a height where they will travel by gravity. These boosters and elevators are entirely automatic and require but little power to run them. Generally, a $\frac{1}{2}$ -hp. electric motor, with suitable chain and sprocket reductions, will take care of the work continuously.

By this means it is not only possible to raise the material to such a level as to permit another gravity section to come into operation, but also to move the products from one floor to the next, or in the case of buildings located on opposite sides of the street, a subway arrangement can be constructed which will continuously feed the product through the tunnel without necessitating surface conveyance over traffic way to the street.

A very good example of how an installation of this kind will save hundreds of dollars a year is furnished by a large axle factory in Detroit, which has departments scattered in a group of fifty buildings.



Cylinder heads being fed to proper points on engine assembly line by gravity roller system

The forge shop is located on the opposite side of an important thoroughfare from the manufacturing departments, which handle these forgings after they are completed. At present a gasoline-driven truck has to thread its way across the busy thoroughfare to the manufacturing department of the factory. The tunnel installation, with a gravity conveyor, will take these forgings across in a continuous stream and will eliminate delays and the element of uncertainty in the transportation of these parts.

Reduction of Material in Process

One of the questions to be looked into when considering the installation of a gravity conveyor system is whether it would cut down the amount of material in process. Wherever parts or stock congregate, awaiting movement by forwarding or transportation men, the plant manager may well suspect inefficiency. No inconsiderable part of the inventory of a plant is made up of the parts in process, and where this inventory is materially reduced, an appreciable cut is always made in the working capital necessary, which is always welcomed by the business head.

When parts must await the action of the forwarders there is no smoothness and continuity of flow, and hence the losses are twofold. First, the inventory is increased, and second, the cost of manufacture is augmented without a corresponding increase in production.

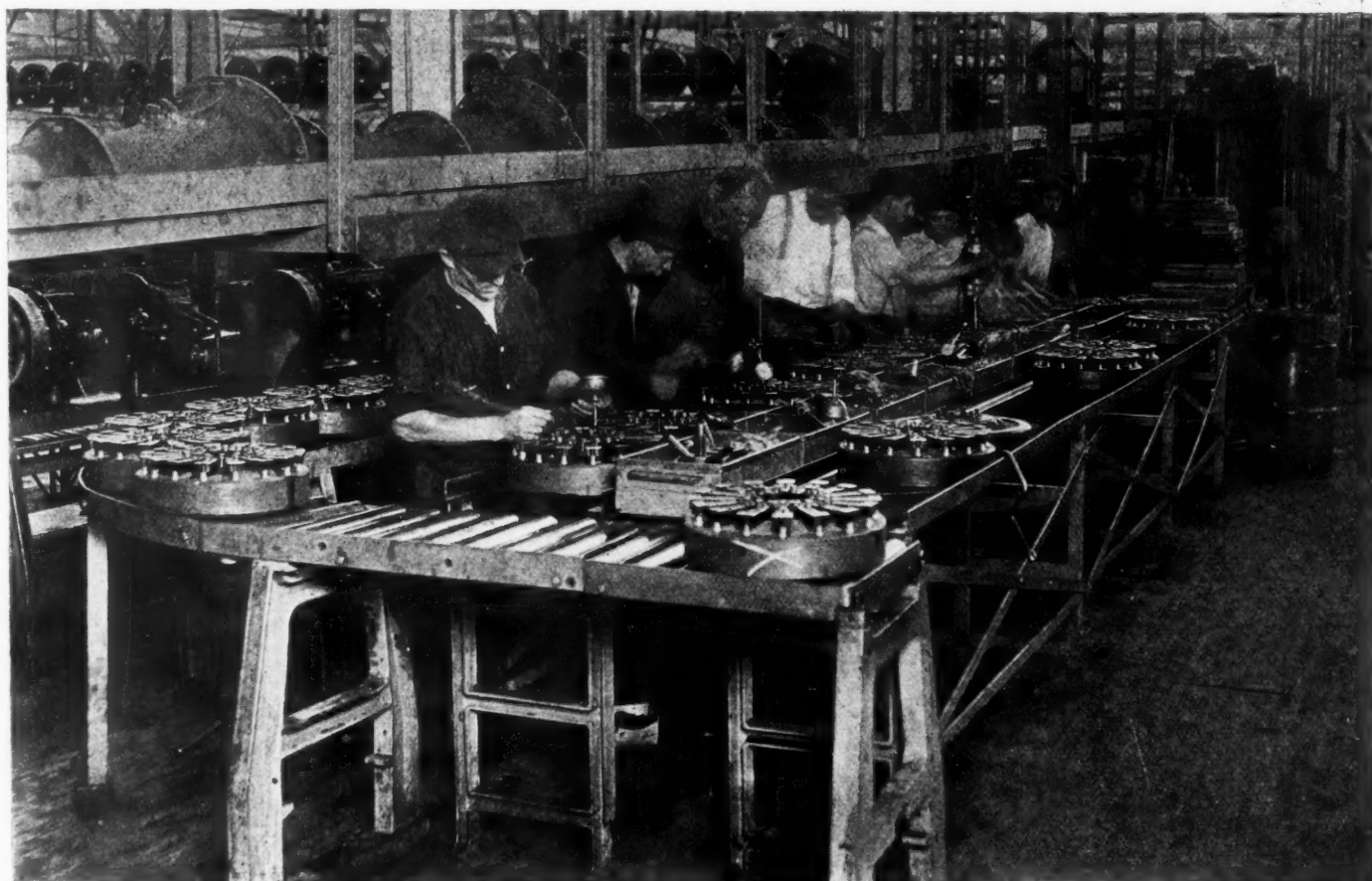
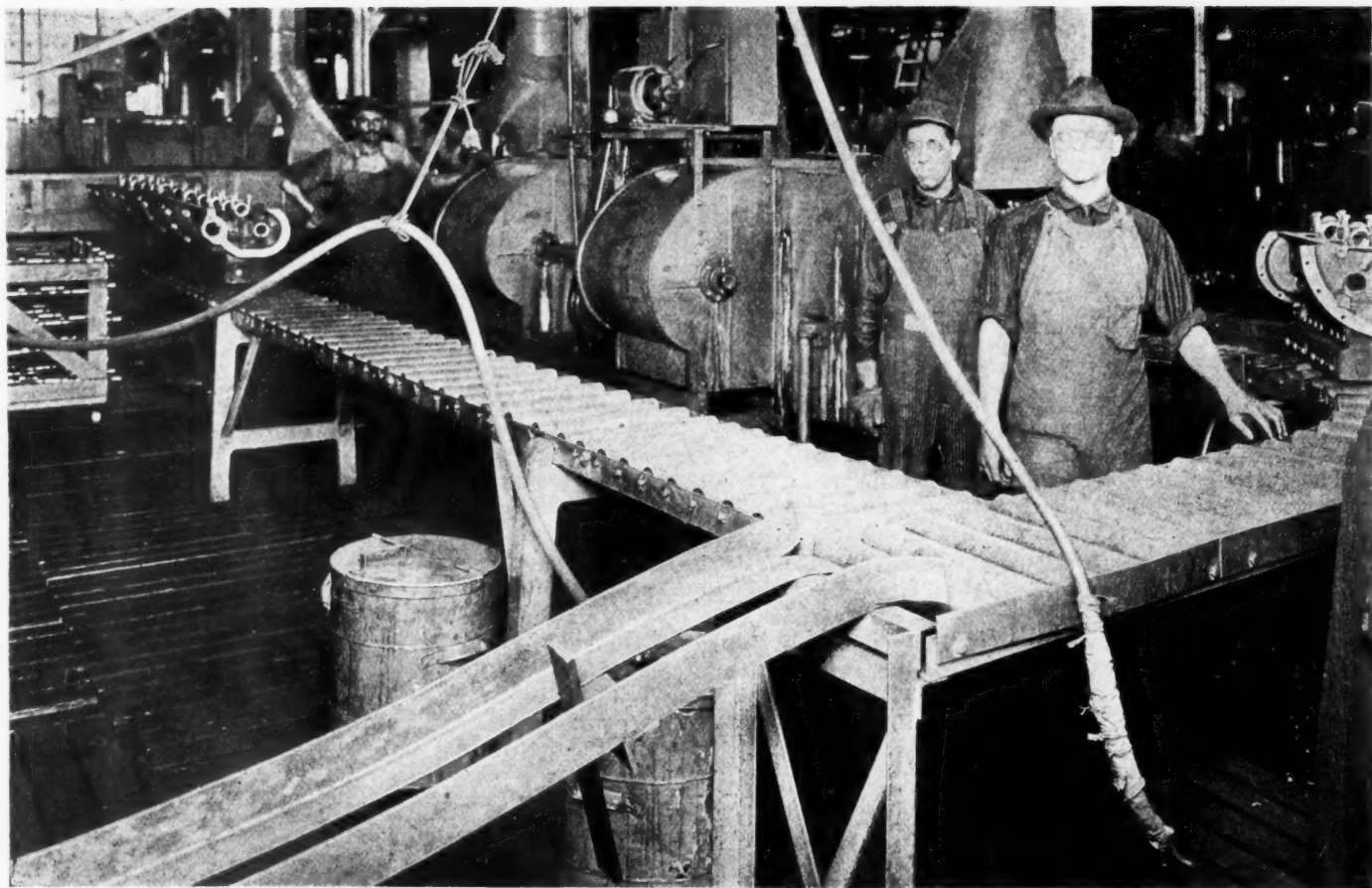
It is not to be understood that the roller conveyor can displace from its proper field the electric industrial truck.

Where the hauls are long, over involved routes and where they can be laid out on a schedule, the electric industrial truck cannot be surpassed. For moving great quantities of small materials in boxes, crates or racks, electric industrial trucks are often required. By their use the number of men engaged in the transportation of the material may often be reduced. In one instance it was reduced from 22 to 11; in another, from 18 to 12, and in still another from 11 to 4. On the other hand, where the gravity conveyor can be used to advantage no truckers are required.

Sub-assembly feeders to the main line assembly—whether mechanically driven or not—can be advantageously of the gravity type. For instance, a gearbox cover plate, which might contain certain parts, could be sub-assembled and then fed to the main gearbox assembly line by a gravity conveyor.

Where assembly is carried along the gravity conveyor line, as it is in engine plants, it is possible to utilize the space beneath the conveyor rollers for parts. There is one objection to this method in engine assembly, and that is the necessity for a man walking along with the job until he completes the operation, if production is keeping a continuous line on the rack. This particularly applies to the adjustment of connecting rods and main bearings, where only one man can properly do the work, as he must know the line along which he is proceeding in shimming the bearing to have it reach a satisfactory adjustment.

Mounted on annular ball bearings, the rollers will allow



Upper picture—A corner in the conveyor system affords a good opportunity for an inspection stand. Note offshoot for rejected parts. Lower picture—Magneto, sub-assembly, with completed magnetos carried away on roller system. In middle distance roller conveyor for carrying transmission housings and in background flywheels rolling to position

a load to travel by the force of gravity on a very slight inclination. Therefore, it is possible to have a reasonably long line of conveyor without a mechanical elevator. On an inclination of $\frac{1}{4}$ in. to the foot, which is quite common, it is possible to have a conveyor system 96 ft. long on a 2-ft. drop, or to travel nearly 200 ft. in going from a 4-ft. elevation to floor level.

In traveling from machine to machine, the distances are rarely more than a few feet, and the gradual drop can be made up at each machine by lifting to a slightly higher level from the table of the machine back onto the conveyor system. Practically any material which will not sag can be advantageously carried on the rollers, and sagging material, such as bags of sand, concrete, etc., can be readily carried if loaded on board slabs.

Factors Determining Applicability of Conveyor

The factors which determine whether or not it is advantageous to install a roller conveyor system are:

- The number of men employed in transportation;
- The foot-pounds of lifting required without the system;
- The possibility of reducing the amount of inventory in process;

The total operators' time saved by inter-machine transportation;

Finally, whether or not conditions are so fixed as to allow a permanent routing for the conveyed material without causing inconvenience.

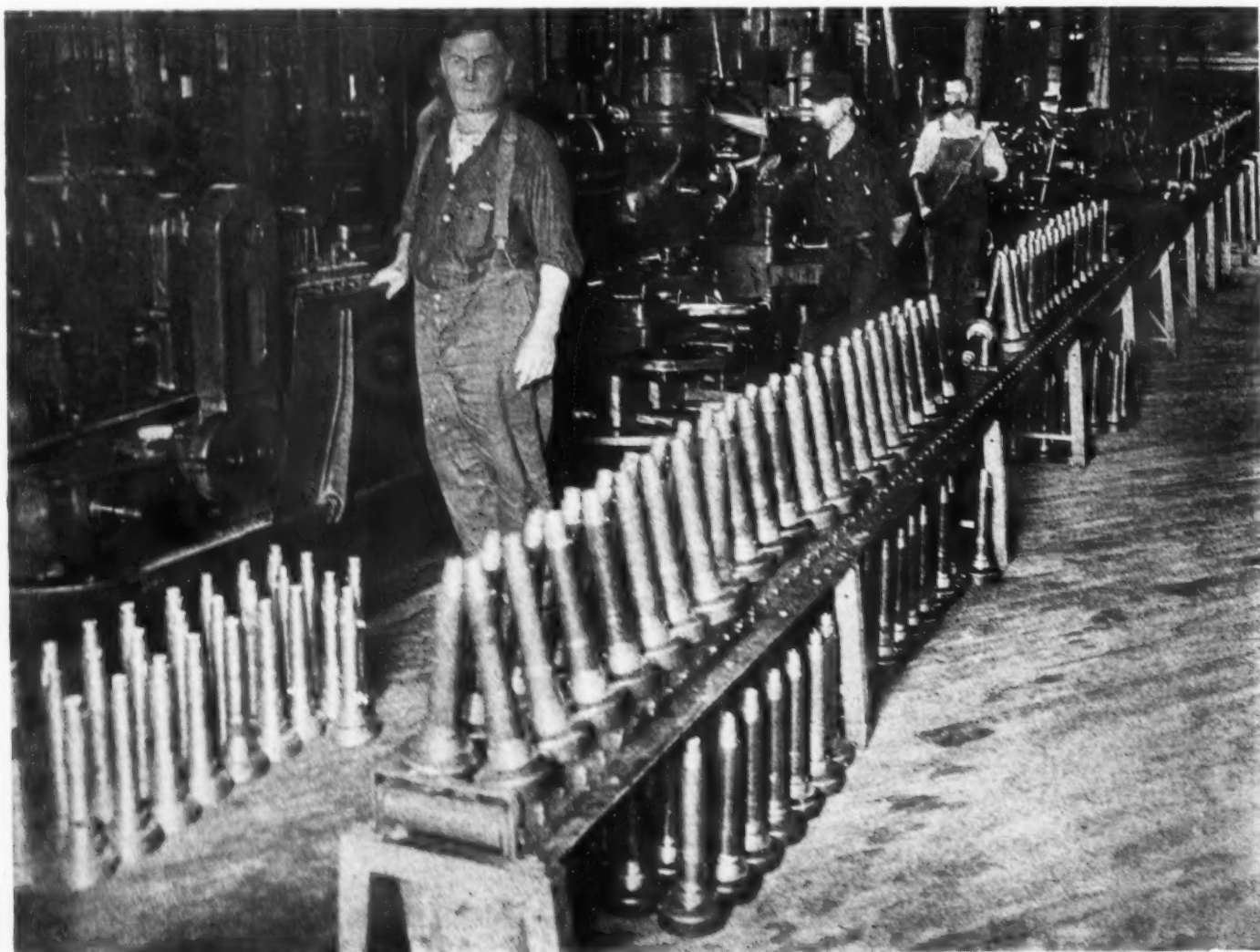
If the chances are that the routing may have to be changed frequently, the industrial truck may be a better method.

There are some ingenious applications of conveyor systems which are out of the ordinary run of requirements but which show how the roller conveyor can be used to actually save labor.

An example of this is where counting is done by means of weight scales. It is possible to have two or three of the rollers mounted on the scale tables, so that the weight is simply registered as the part passes over it. For bolts, nuts, rivets and small parts in general, which are checked in terms of weight, it would only be necessary to have an operator stand and check off the weight as the unit passes over the scale table.

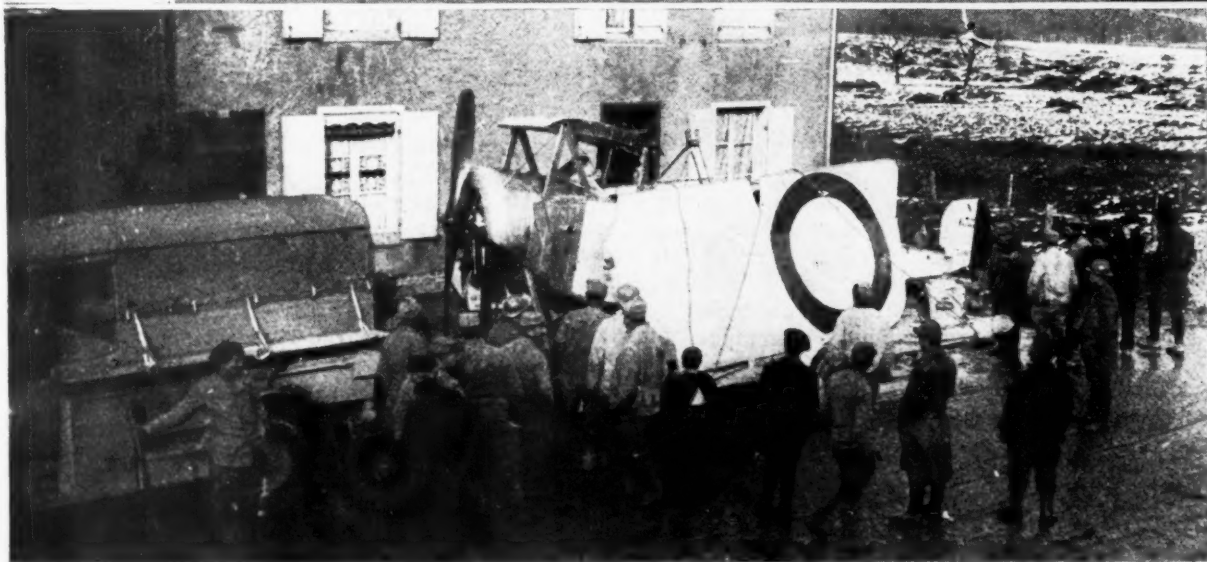
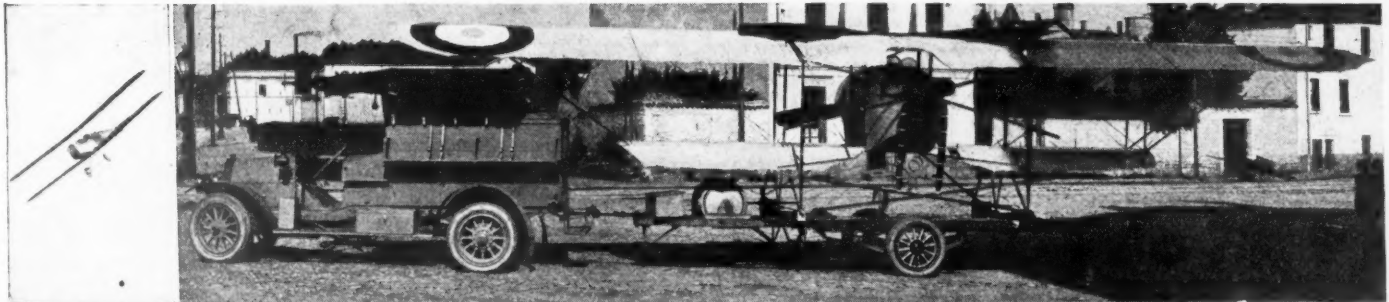
Another unusual type is the portable conveyor, in which the frame carrying the rollers is mounted upon movable horses or stands. This has been of great use in unloading freight cars where the portable conveyor apparatus can be laid down in such a way as to bring the raw material direct to the inspection platform.

Another use is in moving from floor to floor. Instead of using an elevator, which is an expensive piece of mechanism to run, requiring both an operator and electric current, materials can be lowered by means of a spiral chute, the pans, boxes, trays or other units moving directly from the gravity conveyor to the spiral chute and then on to the next conveyor on the floor below.

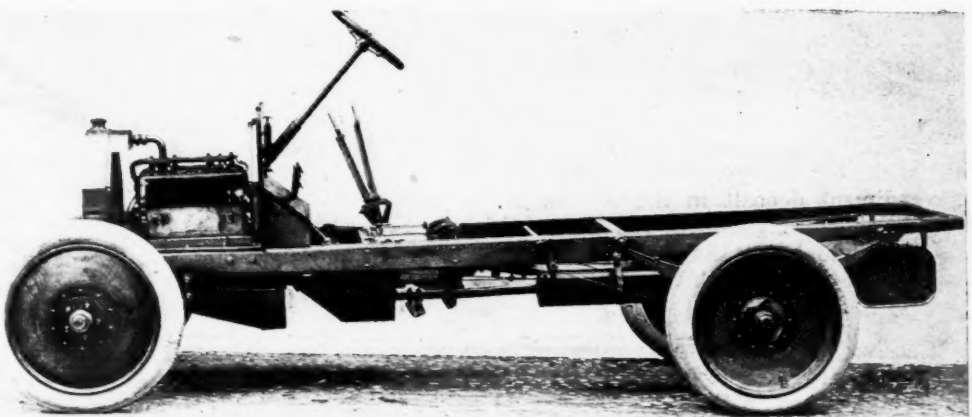


Any shaped part with one flat surface can usually be conveniently handled on a roller conveyor. Space beneath conveyor can be utilized for storage if required

Where Trailers Justified Themselves in War Service



Under defined conditions of service, trailers proved invaluable in wartime. These illustrations show one field where they were indispensable, that of hauling airplanes at high speed. The lower pictures show trucks used to haul airplane trailers on the Italian front



Factors Affecting the Life of Lead-Acid Storage Batteries

Two seemingly contradictory statements, one advanced by a manufacturer of house-lighting plants and the other by an automobile engineer, are taken by the writer as his text. He demonstrates that the apparent difference is one of practice, rather than of principle, and he explains the practice.

By P. L. Rittenhouse*

A MANUFACTURER of house-lighting plants said to me recently: "The batteries we use have very long life because they have thick plates." It happened that on the same day the electrical engineer of an automobile manufacturing firm said to me: "We have studied our battery question very carefully and in theory and practice we find that very thin plates, 3/32 of an inch thick, last the longest." I shall try briefly to reconcile those seemingly contradictory statements.

It has been established that discharge of a storage cell has no deteriorating effect whatever and that it is the charge portion of the cycle that wears away the plates. Let us consider Faure or pasted plates, since this type is in more general use. A pasted plate consists of lead and antimony moulded into a grid of very low chemical activity and of relatively high electrical conductivity and physical strength, into which is pressed material which becomes chemically active to a high degree during the manufacturing process and during use.

From the standpoint of deterioration it is necessary to consider only the positive plate, since the negative plate suffers much less at usual working temperatures. Deterioration in the positive plate is due to the loss of active material during charge, known as sluffing, and is evidenced by sediment deposit in the bottom of the jar. Sluffing is due to gassing within the plate, which is the release of small bubbles as the result of the decomposition of the water constituent of the electrolyte.

Gassing

Gassing takes place as a natural phenomenon of charge, but overcharge, which is the passage of more current than can be absorbed in the normal chemical reduction of lead sulphate to lead oxide, produces excessive apparent gassing, evidenced by a milky appearance of the electrolyte, which causes excessive sluffing in greater proportion than the increase in the charge rate.

It should be remembered that charge rates lower than normal cause excessive sluffing and reduction of useful life as well as charge rates greater than normal, although to a smaller extent. One-fourth normal rate reduces the useful life 10 per cent, twice normal charge rate reduces useful life 15 per cent, and 3 times normal charge rate reduces normal useful life 47 per cent.

It has been found that apparent gassing, and its direct resultant, sluffing, increases with increase of charging current density per unit of positive plate surface, so that where the maximum volume of positive plate material is fixed by capacity requirements, and by bulk and weight

limitations, the number of plates used is determined by the control of charge rate and the capacity requirement at high discharge rates, since the capacity of a cell for starting purposes, where very large currents are required for a few minutes, is directly proportional to total positive plate surface, regardless of thickness.

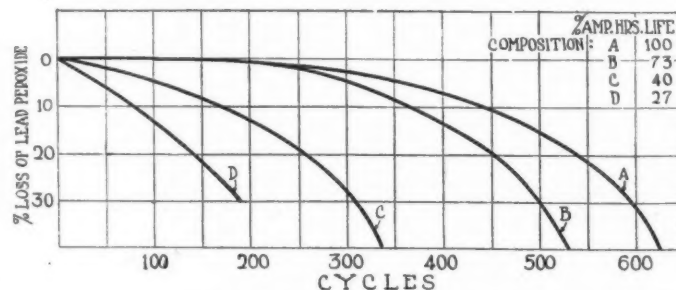
So, in automobile starting batteries, with a given volume, where the normal charge rate is approximated at a wheel speed of 20 m.p.h., and higher speeds produce an excessive ampere charging rate, the overcharge is more readily dissipated by using a greater number of plates per cell, but of less thickness, which reduces the ampere value of charging current per unit of positive plate surface.

Reverting to plate design in batteries for use with house-lighting plants, we find a somewhat different condition. Here we do not have the limitations in cell bulk and weight, and with much more constant engine speed the charge rate toward the end of charge, when decreasing part of the charging current is absorbed by chemical action and increasing part released as overcharge, is more nearly a constant.

Use of Thick Plates

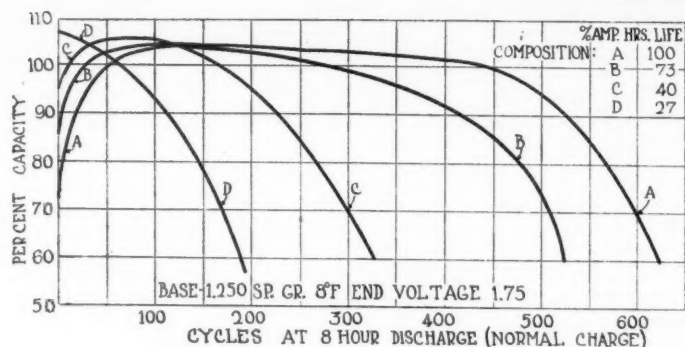
In house-lighting plants the engine is stopped automatically when the battery is charged or the printed instructions caution the owner to stop it. It can, therefore, be seen that in house-lighting batteries, where charge rate is better controlled, and demands on the battery for starting are comparatively low in ampere value, it is infinitely better practice to use comparatively thick plates, which makes a greater quantity of active material available for both use and abuse. The useful life of a cell is considered to have ended when its capacity is reduced to 75 per cent of its rated value.

Let us consider, for a moment, just what factors of plate design and construction influence useful life. There are a number of minor factors of grid construction and manufacturing process that have a bearing on the useful



Shedding characteristics of F.P.L. house lighting

*Of the Prest-O-Lite Co. Paper read before the Isolated Electric Plant Manufacturers' Section of the National Gas Engine Association.



Life of F.P.L. house lighting cells

life of a positive plate under normal charge and discharge, without the abnormal abuse of overcharge, but by far the most important factor is the chemical formula used in preparation of the active paste material, as affecting the cohesiveness between its particles.

The charts herewith show the results of life tests made on plates of varying cohesiveness. Each curve represents the average of 3 plates, undergoing three cycles of normal charge and discharge per day, with one test discharge per week for record, the combined test running for a period of more than six months.

It can readily be seen that the softest or least cohesive material, under formula D, allows maximum chemical action and reaction throughout its entire mass when the plate is first charged and discharged, reaching its rated capacity on the first cycle, but that as a result of this lack of cohesion the particles of material fall away very rapidly through successive cycles, the cell losing more than 30 per cent of its lead peroxide and 45 per cent of its rated capacity during 200 cycles.

As the formula is changed to produce increasing cohesiveness in the material, the resistance to chemical permeation of its center mass is increased, and more cycles are required after the plate is put into use for rated capacity to be reached.

Formula A represents the maximum physical ruggedness attainable in pasted plates, and it will be seen that this very desirable quality makes it necessary for the plate to be charged and discharged about 40 times to reduce all of its material to chemical activity and produce the rated capacity value in ampere-hours when fully charged.

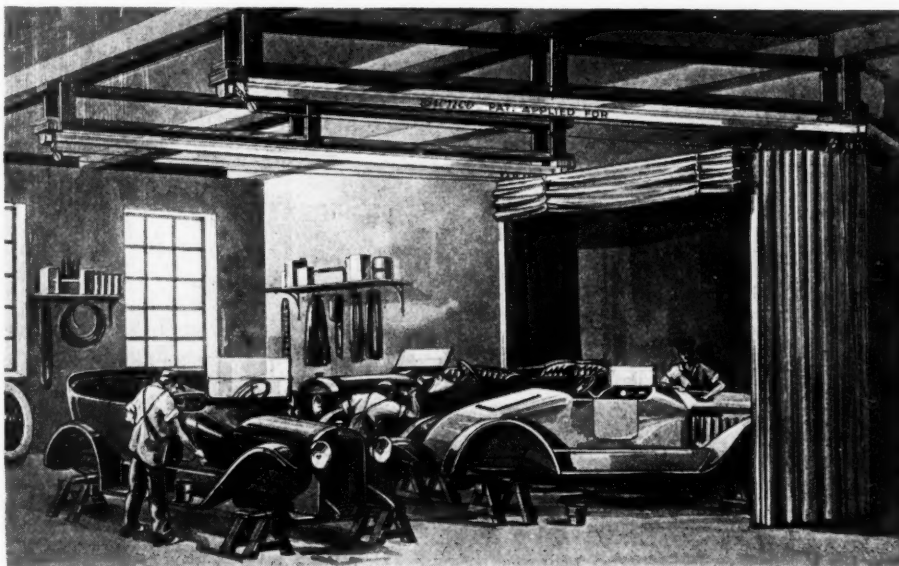
Much more important than this, however, is the fact that these tests with formula A paste maintain rated capacity for more than 400 normal cycles, and show a useful life of 600 cycles, which is subject to some reduction in cases of undue abuse.

A Folding Dry Room

HERE is a folding dry room for use in automobile factories where the space is required at times for other activities. It can be used when there is a rush job, in addition to what can be accommodated in the regular dry room.

The shop where this picture was made has a floor area of 30 x 50 ft., or 1500 sq. ft. The dry room fully extended will occupy a floor space of 15 x 30 ft., and will accommodate three automobiles, about 50 wheels and a number of small parts. It is the practice in the shop where this room is installed to apply the priming or color coat, or varnish during the day, and allow it to dry at night, so that the work is ready for rubbing or finishing the following day.

The two side walls, rear wall and ceiling of this dry room are made of specially processed canvas, and the front, which is of the same material, is so arranged that it can be brailed up, thus giving ready access to the dry room, and making for convenience in folding. The frame-work of the dry room is of seasoned white wood, and is of such design that it can be completely knocked down for shipment. The overhead ties are also of white wood, and serve to support a slotted track of non-corrosive metal.



The entire dry room is suspended from this metal track by means of rollers, toggles and snap hooks.

Where steam is available, a feed and return line are run to and from the heater, and in some instances the exhaust steam from the power plant is utilized. An electric-driven blower is used to circulate the heated air within the room.

This drying room is a new item in the Grenco line.

British Chain Makers Combine

IT recently was announced that the four principal firms making motor chains for vehicles in England had formed an association for the following announced purposes:

Standardizing chains, wheels and chain wheel cutters to insure interchangeability; eliminating unnecessary sizes

of chains; increasing output, and promoting more comprehensive research by co-operation.

The announcement says: It is confidently anticipated that the policy of the Association will enable British driving chain manufacturers and their customers to secure a larger share of overseas business than hitherto.

What Causes Pitting of Exhaust Valves?

This is another war experience, related now that it may be of service to engine makers in time of peace. The investigation was made because of troubles experienced with aircraft engines. Several old theories were discarded as a result of these tests and two very matter of fact influences were settled upon as being the causes.

IN connection with the development of the Rolls-Royce aircraft engines, a great deal of research work was done and, among other investigations, a series were made on the causes leading to pitting of exhaust valves. A report on this investigation appeared in our French contemporary *La Technique Automobile et Aerienne*, from which we have translated the following:

A particular case of this trouble, which occurred on an aircraft engine after several hours of running, was brought to the attention of the firm and an investigation was made without the engine being altered in any way whatever. It was found that the valve was well seated in the cylinder, that the clearance between the valve and pushrod was correct, and that the composition of the steel from which the valve was made was satisfactory. The company claims to have proven conclusively that the pitting of the valve was due to a premature spark at the plug.

Up to this time the concern had periodically submitted its engines to a severe bench test of considerable length. During these tests, not a single exhaust valve even started pitting. It satisfied itself that the conditions of these tests were more severe than those of normal engine service, and was unable to understand the occurrence of these troubles under conditions of normal flight.

The concern also had an examination made of repaired engines, which had seen more than 200 hr. of service, in which the valve had never been changed, nor the conditions of operation varied.

Influence of Mixture Proportion on Temperature

It was found that the maximum temperature of the exhaust valves is from 1300 to 1400 deg. F., and that the temperature of the gases passing the exhaust valve is approximately 1300 deg. F.

It was observed that the valve attains its highest temperature when the cylinder works with the most efficient gaseous mixture; that is to say, when the maximum power is obtained with the minimum consumption of fuel. If the mixture is made either leaner or richer, the temperature is immediately reduced. If the mixture is made leaner, the power of the engine decreases, while, on the contrary, the mixture may be considerably enriched without any loss in power. The general impression that lean mixtures result in excessive heating of the valves is not supported by these experiments.

It was easy to determine that the influence of lean mixtures on the pitting of the valves is proportional to the quantity of free oxygen contained in the exhaust gases. With a properly proportioned mixture, a certain percentage of free oxygen is found in the exhaust, whereas with a slightly overrich mixture there is no free oxygen.

Chromium steel possesses the advantage over tungsten steel that it does not oxidize at ordinary working temperatures. The disadvantage of the use of tungsten steel is

that the valve scales off and becomes gradually thinner in normal operation. Nevertheless, as soon as the valve attains the temperature at which pitting begins, there is no appreciable difference between tungsten steel and chromium steel.

Influence of Valve Clearance

The clearance between the pushrod and the valve stem is naturally directly affected by the elongation of the valve at the normal working temperature. Experiments made show that this elongation is from 0.014 to 0.016 in. A set of valves was adjusted without any clearance when the engine was cold, so that at normal working temperature of the engine the exhaust valves remained 0.0145 in. off their seats. The engine was operated under these conditions for 25 hr., and the valves were in perfect condition when the test was finished. It should be pointed out, however, that during this run the valves were at the same temperature all over, while in regular operation they are cooler on the periphery, which is in contact with the valve seat.

It was found to be possible to operate the engine with the valve head never coming closer than 0.008 in. to its seat and still obtain a cooled circle around the periphery of the valve. It is to be presumed that in that case the valve is cooled by the small volume of gas which passes around it at a considerably reduced speed, and is itself cooled by its contact with the valve seats in the cylinders.

Experience has shown that, if the clearance is reduced to nothing, when the engine is cold, the output is reduced by 1.5 per cent, and that later it was possible to run with a clearance of 0.005 in. without loss in power.

In continuing these experiments the push rods were adjusted in such a way that the valves could not descend to within less than 0.010 in. of their seats. The result was that the power was reduced, the reduction attaining a value up to 15 per cent, and that the exhaust valves became excessively hot.

Valves Heated Most Around Circumference

Under these conditions the valves heated most around their circumference, and were coolest nearest the stem, this being the reverse of the results obtained with the correct adjustment of the push rod. This experiment also brought out another interesting point, namely, that the valve was found by far the hottest at that point of the circumference closest to the center of the cylinders.

This is particularly interesting to note, because when pitting of a valve occurred, the question was never asked why a particle of metal should become detached at a particular point, leaving all the rest of the valve in a relatively good condition. During this test it was noted that this flake became detached exactly at the point already mentioned, where the valves became the hottest. In line with this observation, it was found that if a valve rotates around its own axis while the engine is running, it takes

a much longer time before pitting commences. From the instant that the valve begins to pit, it stops turning.

In order to reproduce the condition of an engine operating with deformed valve seats, the valves were filed on their seats. Two of them were filed in such a way that it was possible to pass a 0.005 in. feeler between the valve and the seat to others, so that a 0.008 in. feeler could be inserted, and two others so they would admit 0.012 in. feelers. The engine fitted with these valves was then run during 15 hr. At the end of this test the valves were examined, and a slight incipient pitting was noted at the point where the valves had no bearing, but the results were nothing as compared with those mentioned in the reports received from the Military Services. The company therefore considers that the light deformation which may be produced in the seats of valves is not the cause of pitting.

Effect of Premature Ignition

It was found during these tests that with a spark plug which fires too early it was possible to pit even the S. A. S., or "quick set," valve in 6 to 8 min. A test was made with a six-cylinder Eagle engine, with the object of reproducing the condition of pre-ignition due to an overheated spark plug. To that end one magneto was correctly adjusted, and a second connected so that it could be made to ignite at any desired point of the cycle, which enabled the operator to produce premature ignition at will.

It was found, however, that the conditions thus obtained were absolutely different from those due to an overheated plug. The artificially produced pre-ignition considerably reduced the power of the engine, without, however, causing any excessive heating.

Later a test was made by using a coil and obtaining from it a continual spark at the plug, in the hope that this arrangement would reproduce the effect of an overheated spark plug, but it was again found that it was impossible to reproduce the same conditions as obtained when ignition is caused by an overheated plug.

A plug which ignites under these conditions of running brings the exhaust valve up to the temperature of incandescence, and it is remarkable that the valve is able to operate at all under these conditions.

Effect of Oil in Combustion Chamber

It was noted that pre-ignition was very largely influenced by the quantity of lubricant within the explosion chamber. Messrs. Rolls-Royce point out that they have never come across a case of pre-ignition in an over-lubricated cylinder, and that it has been proven by experiment that if a spark plug begins to cause premature ignition, the trouble may be stopped immediately by injecting a little oil into the air intake of the carbureter. It has also been proven that it is possible to inject a certain amount of oil without affecting the power output of the engine, but this reduces the temperature of the valve.

Effect of Defective Circulation

It was discovered in the course of these experiments that the water circulation has a very strong influence on the rise of temperature of the exhaust valves. It was noted, in fact, that if the water circulation is defective, the first part affected is the exhaust valves. In watching an exhaust valve during the operation of the engine, it is easily seen that as the rate of circulation decreases the valve becomes hotter, and the valve head and its guide even attain a dark red, though there may be still a certain amount of water in circulation.

If the stoppage of water circulation causes pre-ignition, due to the spark plug, which is a natural consequence, the valve begins to pit in a few minutes.

As a result of the investigation outlined above and of information obtained from the Military Services, Messrs. Rolls-Royce consider that pitting of exhaust valves is due to two causes:

1. Defective water circulation.
2. Self-ignition.

The first of these is the most frequent cause, and it may be responsible for the second.

This conclusion is based upon the fact that the complaints regarding pitting of valves were more frequent during the summer months, and that the squadrons which had the greatest amount of trouble were those having engines whose cooling system is admittedly somewhat unreliable. Not a single instance is remembered where a valve was pitted on an F E 2 D plane, although these machines were equipped with engines having very thin valves made of tungsten steel, and which, according to the experience of the manufacturers, should have given much more trouble than the later series.

At a later date engines of a more recent series were mounted on these machines, but no trouble whatever was experienced from pitting of the valves. It is believed that as the circulation of water diminishes, the water begins to boil, and consequently is lost by spraying and evaporation, a difficulty which it is not always possible to obviate.

As the engine continues to turn, the conditions become worse, and at the hottest part, that is to say, that portion of the water jacket surrounding the exhaust valve, steam is formed, which tends to force out the water, and consequently produces a back pressure on the pump, whereby the rate of circulation is further decreased. At that moment, pre-ignition sets in, the power decreases and the valves begin to pit. It is asserted that pre-ignition never occurs in service, if the necessary precautions are taken.

Chief Cause of Troubles

The chief cause of these troubles is that the engine is started with the oil too cold, thereby reducing the quantity which escapes from the bearings, and consequently the amount which reaches the pistons. The result is that the tendency toward self-ignition is considerably increased. Of course, occasionally a defective spark plug gets by, which may cause pre-ignition.

It is therefore concluded that the exhaust valve really serves as a safety valve with respect to overheating, and that it would be much more dangerous if the piston was the part most seriously affected by the heat. A pitted exhaust valve does not prevent a pilot from reaching home, and the valve is easily replaced. If overheating occurs in the engine, the exhaust valve is the most appropriate weak link, any injury of which will cause the least annoyance.

Very encouraging results were obtained by increasing the rate of waterflow around the valves. Further experiments bearing on this point are being undertaken at present. It has been found that the radiator and its piping offer by far the greatest resistance to the water circulation, and all unnecessary resistance should be carefully eliminated. All obstructions in the circulating system should be carefully guarded against.

A RECENT investigation of the Nertshinsk mining districts of the Transbaikalian territory in Siberia has revealed the presence of wolfram in Bukukaberg, 66 miles from the railway station of Borzia; in a mineral layer, 4 miles from the Ghara-Nor Railway; in the neighborhood of the village of Oldanda, 40 miles to the east of Borzia; and in Shirlofberg, 17 miles from that town. Wolfram is the ore from which tungsten is made.

How Portable Searchlight Equipment Was Used in the War

With the coming of civil landing fields for airplanes, there will be a demand for the equipment developed during the war to guide and aid aviators. While American firms worked out searchlight equipment, it did not see much service. In this article Mr. Bradley tells of the equipment that stood the test of actual use. It is no secret that automotive manufacturers already have received inquiries for searchlight equipment for more prosaic civilian uses.

By W. F. Bradley

PARIS, Aug. 14.
AUTOMOBILE searchlights were employed on a very big scale during the war for two main purposes: The lighting of aviation landing grounds and the spotting of enemy movements. The requirements were so varied that no standard type could do all the work. From a little 2-kilowatt set to be carried by men or mules, and taken into the front line trenches, they ran up to 60-mile beam searchlights used for guiding airplanes back to their grounds.

In the air service the greatest requirement was for a mobile set capable of lighting the landing grounds on the return of planes from nocturnal expeditions. Taking the French service as an example, the planes operated in squadrons, with four squadrons forming a group and having a common aerodrome. If these planes had to do night bombardment or, as was the case toward the end of the war, night reconnaissance, it was necessary for the ground to be sufficiently well lighted to permit pilots to land in comparative safety.

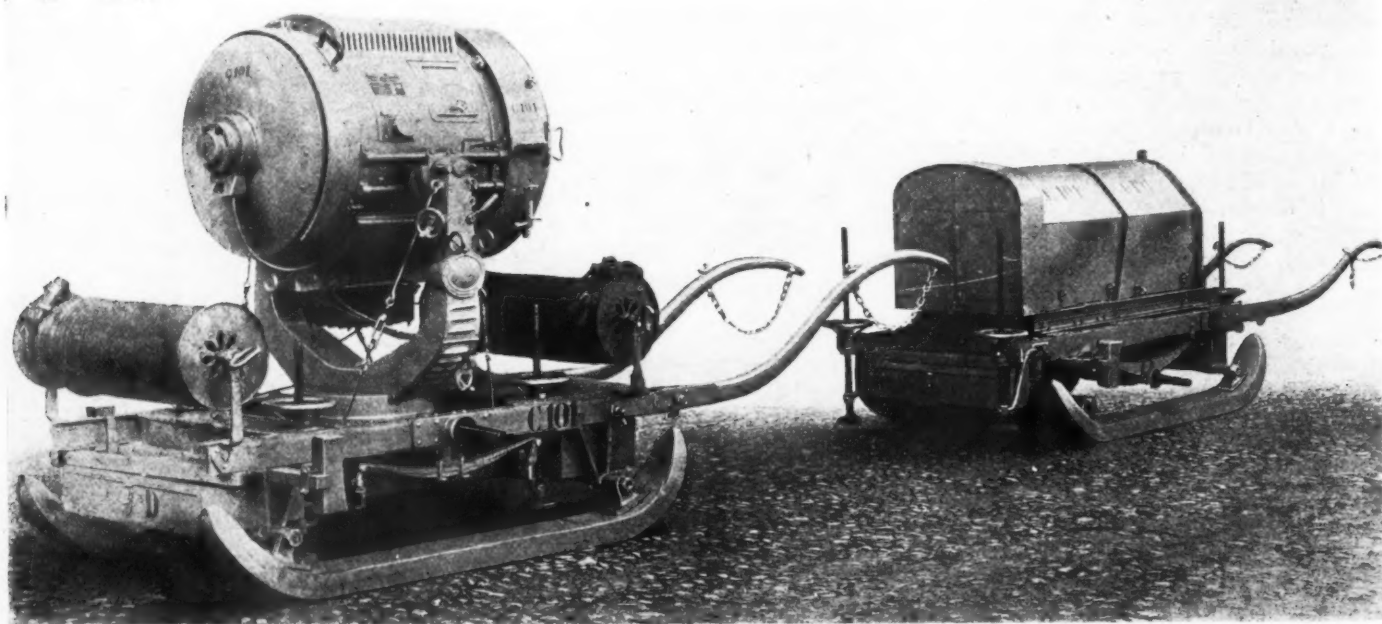
When the squadron was operating for the protection of an important center, as for instance the protection of the city of Paris, it was the general plan to have permanent

installations on the ground, and to obtain the required current from the most convenient generating station. This could not be done, however, on the front, where the squadrons had to follow all the movements of the army, and where changes of aerodrome had to be made at frequent intervals in order to puzzle the enemy.

For this work the French Service made an almost exclusive use of Crochat field illuminating trucks, which were also employed in the American Air Service. These were a special truck having a direct coupled generator, two electric motors and final drive to the rear wheels by means of side chains. The gasoline engine was a Ballot four-cylinder of 90 by 150 mm. bore and stroke, which was used not only to drive the vehicle, through the generator and the electric motors, but also to provide current for the searchlights.

The Crochat was fitted with a special all wood body having rear entrance, and specially designed with lockers for receiving the lamps, ladders and other equipment. All the controls were inside, so that after the engine had been started, the electrician had complete charge of everything without leaving the interior of his car.

The main electrical equipment consisted of a series of



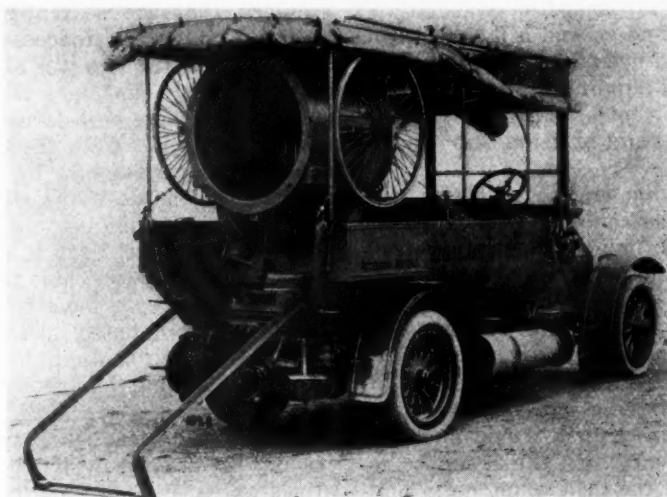
Italian army searchlight to be used either as a trailer or as a sleigh

four lamps of 4500 candle-power at 25 volts, each one of which was mounted on a telescopic tripod 11 ft. in height, these tripods being placed on the ground at intervals of about 30 yd. A ladder combined with the tripod enabled the electricians to regulate the lamps. Usually the truck took up a position on the center of the line and fed current to the lamps by flexible cable carried on reels, the result being a broad beam of light which was cast down the field in the direction the plane should land.

It was obviously essential that the field should only be illuminated when a plane required to land. At the same time, planes returning from an expedition had to be in a position to locate their own landing grounds and call for light to be switched on. The method of operating was to leave the whole camp in darkness with the exception of an automatic signalling lamp above the roof of the field illuminating truck. By means of a small electric motor and a combination mechanism, there was flashed a word in the Morse code, this word being repeated automatically so long as the motor was kept in operation.

This word was changed every night and was only communicated to the pilots starting out on an expedition. Consequently, an enemy plane seeing the signal might be aware that there was a landing ground in the neighborhood, but he learned nothing more. The friendly pilot, on the other hand, knew from the signal exactly what ground he was over, and if he wished to land there he signalled back the correct request for light, which was immediately furnished.

This was the general method of operating. As the war developed and special night missions were given to airplane pilots, such as the landing of secret service agents, the bombing of convoys on the road, etc., the requirement was felt for searchlights on the planes themselves. Experi-



Rear view of standard Italian army automobile searchlight. The lamp has a face diameter of 36 inches and can be used either in the automobile or from the ground

ments were carried out with electric generators driven by aerial propellers. With these it was possible for a pilot to pick out his location with a considerable amount of accuracy. Flying at a few hundred feet above the ground, his lights turned downward, it was always possible to ascertain whether the ground immediately beneath was suitable for landing or not.

With this system no batteries were carried, the consequence being that the actual landing was a very hazardous occupation even for a skilled pilot. After being perfectly illuminated the field was plunged into complete darkness for a few seconds before the actual

contact with the ground, and that brief interval was a most trying time for the pilot, who waited for the slight shock which seemed to be ages in coming. The only reason for not using batteries was the considerable weight they represented. Very few pilots, however, were satisfied with a system which plunged them into darkness just when they were most in need of light.

Aviation requirements were practically the same whatever the front operated on. The artillery and the infantry, however, needed special vehicles according to the nature of the country and the type of operations carried out. For work in the front line trenches, where everything had to be carried up by hand, almost as much use was made, in the early stages of the war, of acetylene as of electricity.

The smallest electric generating set used on the front appears to be a 2½-kilowatt unit built by Fiat in conjunction with Galileo, of Florence. This outfit, comprising gasoline engine, generator, searchlight, tanks and stand, had been designed to be carried on the backs of three mules, or by six men. There was practically no position attainable by man or mule into which this set could not be taken; this, of course, was a very essential feature for mountain warfare.



The biggest type of Italian army searchlight. It was hauled by a Fiat 3-ton truck which also carried the generating set

The engine is a two-cylinder air-cooled V-type with a sheet metal housing over the cylinders and a flywheel fan drawing a draft of air downward over the cylinder heads. The cylinders are mounted on an aluminum base chamber, and the crankshaft is carried in ball bearings. Intake valves are mechanically operated, and ignition is by high-tension magneto.

Immediately behind the gasoline engine and attached to it by a flexible coupling is the compound wound generator operating at 60 volts, 40 amperes. Although detachable, these two form a single unit when carried by mule. Taken off the back of the animal, the set rests on four legs and is ready for instant cranking. A gasoline tank with a capacity for three hours' running stands on three legs and is connected up to the carburetor by a flexible pipe. The searchlight, having a diameter of 20 inches, is carried in a fork mounted on a tripod and has 75 yards of flexible cable, thus enabling the lamp to be installed this distance away from the generating set. The weight of the generating set is 176 pounds; the weight of the complete searchlight is 86 pounds, and the weight of the entire equipment, as carried by the three mules, 500 pounds.

The most commonly used type of searchlight in the different European armies was one having a face diameter of 36 inches. For the Italian army this was automobile carried, the vehicle being built by Fiat and the lamp by Galileo, of Florence. Practically a standard 1½-ton chassis was used for this purpose, the engine being a four-cylinder block of 3.9 by 5.5 in. bore and stroke and the chassis having four speeds and shaft drive, with single pneumatic tires in front, duals at the rear. Mounted on a supplementary frame, almost directly above the gearbox, is the 10-kw. direct-current generator driven from the clutch shaft by means of a silent chain.

The style of body adopted was practically a close-coupled passenger type with a rear compartment for the searchlight. This latter was mounted in forks and carried on a low pedestal with folding legs. While the searchlight could be operated from the automobile chassis, and frequently was used in this way, military conditions often

required that the searchlight should be placed in some position altogether inaccessible to an automobile. The separating of the two was also on many occasions a matter of elementary caution. For this purpose, demountable rubber shod wire wheels were supplied ready to be fitted to the platform. With these in place the searchlight was run off the automobile by the use of mobile rails and pushed into the desired position not more than 120 yards from the generating set.

A 36-inch searchlight is practically the biggest type it has been found practicable to use on an automobile vehicle. When bigger types have been required they have practically all been mounted on trailers. An example of this is the Fiat 59-inch searchlight which is mounted on a four-wheel trailer and hauled by a 3-ton truck. The chassis of this truck is a standard type, only the body and seating accommodation being special. In this case the generating set is entirely independent of the truck, and comprises a four-cylinder engine with generator immediately behind it, the whole being mounted on a straight frame and carried on four steel shod wheels.

A modification of the above is the same searchlight carried on a two-wheel trailer which is also fitted with runners for traveling over snow. When it is no longer possible to travel over the roads, the wheels are detached and the trailer allowed to rest on its skids. In this condition it is drawn by horses. The same arrangement is adopted for the generating set, which can be drawn by a truck as a two-wheel trailer or pulled by horses as a sleigh.

Searchlights up to 78 inches diameter have been used by the artillery and are moved about the country aboard trailers. Owing to the delicate nature of the mechanism, it has been found necessary to design special trailers the suspension of which has received more careful attention than that of the most luxurious touring car. The French had a number of these in use during the last year of the war. The chassis was a specially designed four-wheel type on automobile lines with pneumatic tires and very long cantilever springs at the rear and semi-elliptics at the front. This searchlight was always operated from its trailer.

Welding the Inside Walls of a Cylinder

FIVE cracks were found on the inside walls of an automobile engine cylinder. Holes were cut in the outside wall, as this was the only method of reaching the inside wall cracks. The welding then proceeded as shown in the

picture, an Airco oxy-acetylene torch being used. Then the outside water jacket was restored by welding in new cast iron. This is a marked step in the recovery of wasters.



Properties of Duralumin

CAST duralumin is not as strong as cast aluminium, but after annealing it acquires a remarkable strength. The alloy must be annealed with care and must subsequently be worked only when cold. Soldering must be avoided, and joints must be made with duralumin rivets, which are superior to copper and even to steel rivets. The properties of the alloy vary greatly with the treatment, and frequent tests of samples are necessary in quantity production. Samples of German duralumin show about 84.8 per cent. of aluminium, 11¾ per cent. of copper or 5¼ per cent. each of copper and zinc, about 2 per cent. of tin, and small quantities of other metals which are probably impurities.

Duralumin deteriorates if exposed to high temperatures, but it can be used with advantage in any position on aircraft not too near exhaust-pipes and the hotter parts of the engine cylinders.



The FORUM



Remarkably High M. E. P.

Editor Automotive Industries:

IN AUTOMOTIVE INDUSTRIES of Aug. 14 last there appeared an article entitled "Unconventional Design of a British After-War Car," in which substantially the following statement appears:

That a 5-cylinder engine of 2.44-in. bore by 3.15-in. stroke, when running at 2500 revolutions developed in the neighborhood of 32 b.hp.

This would give an m.p. (m.e.p. per b.hp.) of 137, which seems so unbelievably high that there must be some error somewhere.

The average automobile engine has an m.e.p. of 64, Packard aviation engine 79.4, Benz & Co. engine, which obtained the first prize in competition, 107, and I believe the Liberty aviation engine is somewhere between 107 and 110. In other words, if the Enfield-Allday delivers 25 b.hp. it is doing *remarkably well*.—HERMAN LEMP, Engineer, Erie Works, General Electric Co.

We fully agree that if the Enfield, with the cylinder dimensions given, develops in the neighborhood of 32 hp., it is doing remarkably well. We usually check up statements of horsepower output that seem extravagant, by calculating the corresponding brake mean effective pressure, but the item in question had not excited our suspicion, probably because the cylinder number and dimensions are so unusual. In general, if the b.m.e.p. figures out to over 100 lb. per square inch in an automobile engine we regard the claim with skepticism.

We have figured out the b.m.e.p. corresponding to 32 hp. with the cylinder number and dimensions above given, at 2500 r.p.m., and reach the same result as Mr. Lemp. If the Enfield concern actually obtained the result from their calculations, they would be well advised to have their dynamometer checked up and their dynamometer horsepower formula verified.—EDITOR.

Effect of Water Injection

Editor Automotive Industries:

IN a recent issue you gave a résumé of a pamphlet reporting the results of experiments on the influence of water injection upon engine performance by the Bureau of Standards, the reading of which would seem to suggest that the introduction of water in small quantities into the cylinders was of no advantage.

A correspondent a week or two later spoke of the benefit which he had received and asked the experience of others. My experience for some three years past has been that although the engine was in need of carbon cleaning when I first began to use the water, it picked up power at once without being cleaned, and has never been cleaned since, while its performance has always been as efficient as if newly scraped. My practice has been to allow about eight ounces (a glassful) of water to run over into the intake manifold after the engine is fully heated up and permitting the flow to be as great as the engine could take care of without much affecting its speed on the road. This has been done at very irregular periods, probably once in twenty-five miles as a minimum and once in seventy-five as a maximum.

I have read the report referred to and I understand that

the scope of the inquiry was limited to the question whether the injection of a small amount of water might slightly increase the power of the engine, aside from the question of carbon cleaning, i.e. assuming a clean engine, the question was whether an airplane engine not carbonized could be made to give a little more power with the addition of water. In other words, whether water could be burned in the engine. The experiment showed that it could not. Such claim has been made in advertisements, but seems to be without basis in fact. From my experience I should be inclined to say that the carbon is not even cleaned out in the cylinder, but reduced to an amorphous condition which renders it harmless so far as the engine operation is concerned. I understand that the Bureau of Standards expect to continue their experiments and to cover the matter of carbon removal by various methods, including water injection.—CHARLES E. MANIERRE, New York.

Motor Affairs in Britain

An English correspondent sends the following under date of Aug. 5:

THOUGH there has been little comment up to the time of writing on the Board of Trade decision to raise the embargo on cars for import up to 5,000, it is largely because there is so little live interest in trade, and partly because of the nearness of the August general holiday when the decision was revealed.

From inquiries in importing trade circles, I gather that it is not understood whether, and to what extent, this concession applies to the import of European cars, some of which, e.g., the Darracq and Charron, are made in France largely by British capital, and the De Dion, Panhard, Peugeot and less known French makes, and to the F.I.A.T. from Italy, not to mention the Belgian contingent as being at present non-existent commercially.

Personally I think that the part played by the American Chamber of Commerce has been so prominent in this connection as to point to the concession being mainly of benefit to the importing American traders.

So far as the output of British cars is concerned affairs are lamentable; letters from private persons frequently appearing in the press complaining of continued disappointments after repeated promises of delivery, one writer saying he has now no hope of getting his car until after this season, so that it is not surprising that there are some who question the utility of holding a motor show this year, for, as they urge, if a whole year has elapsed since the armistice without any evidence of a return to normal production, and if cars are now only beginning to go through the shops, what use is there enticing the public to a London Show, which, if it is an honest display of goods in production, must be limited to revised pre-war models, and if limited to genuine post-war models, will be apt to mislead buyers.

What with labor troubles and the general sense of insecurity, I should not be surprised if the trade motor show be postponed until next year. The producers, The Society of Motor Manufacturers and Traders, already have dropped the scheme and plan for uniform stands and stand decorations because the contractor feared that labor troubles at the eleventh hour might hold him up.

Pertinent Comment on the Ohio Tractor Tests

The usefulness of well conducted tractor tests has been much discussed, and the supporters of the test idea welcome the recent Ohio tests and, as they expected, found much in the figures produced that is significant. In this article Mr. Heldt draws attention to some of the figures and he points out wherein these figures will be of immediate value to the tractor buyer and, of course, ultimately to the manufacturer.

By P. M. Heldt

THE information compiled at the tractor tests at Columbus, Middletown, Fostoria and Akron, Ohio, last month is primarily of value to the prospective purchaser of a tractor. This is the natural result of the tests being conducted by the Agricultural Engineering Department of the State University. Eventually the figures will be of great value to the manufacturer, as they will indicate for him the possibilities that he must put into his machine.

Some of the factors which make a tractor desirable to a prospect cannot, of course, be brought out by a test lasting only a few hours. What would probably interest the farmer most is the relation of the maximum horsepower developed by the different tractors to their rated horsepower. It is well known that in the past there has been a tendency among tractor manufacturers to over-rate their machines, and in some of the agricultural states legislation has been proposed or enacted with a view to curbing this.

Rated Drawbar Horsepower

The Ohio results show that even under the most favorable conditions, when the tractors are being operated by factory experts, they are, on the average, barely able to develop their rated drawbar horsepower. At Columbus, the average horsepower during the normal tests was 101.8 per cent of the rated drawbar horsepower, and in the maximum tests it was 104.7. In the tests at Middletown, in which the greatest number of individual tractors took part, the drawbar horsepower was on the average 87 per cent in the normal tests and 91 per cent in the maximum test. At Fostoria, the tractors developed 100.2 per cent of their rated drawbar-power in the normal tests, and 103.5 per cent in the maximum tests. At Akron the figures were 91 per cent and 95 per cent respectively.

Strange as it may seem to some, quite a number of the tractors developed greater horsepower during the normal tests than during the maximum tests. A ready explanation for this fact may be found, however, when it is considered that in the maximum tests the plows were adjusted, not to get the engines to work at their maximum horsepower, but rather at their maximum drawbar pull on the regular plowing gears, and it is well known that all engines develop their maximum torque at a speed which is well below that corresponding to the maximum power output. The drawbar pull available, of course, is directly proportional to the engine torque.

While the average drawbar horsepower, developed both

in the normal and in the maximum tests does not vary greatly from the average rated horsepower, there are great variations between the two factors in the case of individual tractors. Thus, one of the tractors taking part in the Columbus test developed more than twice its rated drawbar horsepower, while another, in the Middletown test, developed only 52 per cent of its rated horsepower.

It has heretofore been customary to regard the draft in plowing as proportional to the sectional area of the soil turned. This assumption may be justifiable where the depth of plowing does not vary greatly, but it can easily be imagined that the draft increases faster than the depth, if the latter goes beyond the normal depth of cultivation and the plow enters hard pan.

The draft required per square inch of section turned, no doubt, depends upon three factors besides the character of the soil; namely, the depth of plowing, the speed of plowing, and the type of plow used. An attempt to establish a relation between the draft per square inch and depth of plowing by graphical means proved unsuccessful, no doubt on account of the more important influence upon the draft of the type of plow used. The method of procedure was to take all of the tests at any given point and plot the draft per square inch against the depth of plowing.

Comparing the drafts with the same machine with the plow set for different depths, it is found that the draft per square inch is greater when the plowing is deeper; in other words, the total draft increases faster than the depth of plowing. From a comparison of the draft of a considerable number of the competing tractors when plowing at their maximum depth and at their normal depth, respectively, it appeared that the draft per square inch increases approximately as the 1.1 power of the depth.

Testing Old Rules

It has been a rule among tractor men to figure on a draft of 500 pounds per 14-inch bottom, when plowing to a depth of 6 inches at the rate of 2 miles per hour. The Ohio tests show that while this rule is safe for light, sandy soil, it does not apply to the average conditions in Ohio. At Columbus, where the soil is described as clay loam, hard and dry, with heavy subsoil, the average draft was 7.34 pounds per square inch. At Middletown, where the soil is described as sandy loam, wet surface, hard, dry subsoil, the average draft per square inch was 7.45 pounds; at Fostoria, where heavy dry loam and rocks were en-

countered, the draft was 7.73 pounds, and at Akron, where the soil was sandy loam, dry and hard, the draft was 5.92 pounds. All these figures are based on the maximum test results; that is to say, when the plowing was deepest.

The character of the soil at the different test fields is also reflected by the maximum depth to which the tractors could plow. Thus the average depth in the maximum tests at Columbus was 8.5 inches, at Middletown 8.1 inches, at Fostoria 8.33 inches and at Akron 8.63 inches.

As a result of the Ohio tests the old question as to the suitability of the high speed engine for tractor work is undoubtedly going to be revived. While practically all of the tractors had difficulty in developing their rated drawbar horsepower, one of the tractors, equipped with a high

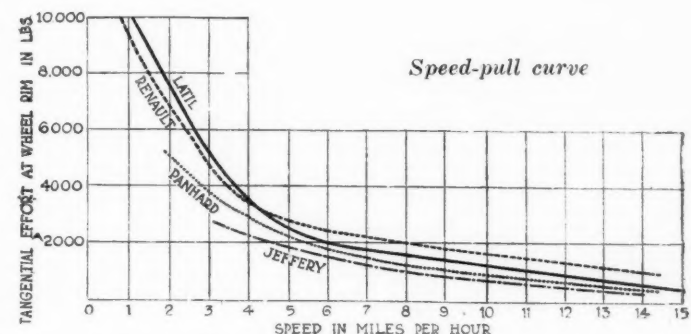
speed engine, showed twice its rated horsepower. This machine has a governing device which makes it possible for the operator to readily change the governed speed of the engine. By setting this governor for high speed, a high power output can be obtained from the engine, but the question of engine life then crops up. There can be no doubt that of two engines of the same general quality of construction, one running at 750 r.p.m. normally and the other at 1500 r.p.m. normal speed, if the degree of loading is the same in both, the high speed engine will have shorter life. But since under these conditions the high speed engine will develop substantially twice the power as the low speed engine, the former might be run at a smaller percentage of its maximum load.

French Road Tractors

IN France the term "tractor" is ordinarily applied to vehicles very similar to our motor trucks. In fact, we would class their Latil, Renault and Panhard tractors as motor trucks, as they have body springs, rubber tires and truck bodies. These French tractors, however, are built primarily for hauling trailers, forming the "locomotives" for road trains. The Renault, Latil and Panhard tractors are mentioned because they are the leading makes of this kind of vehicle. A comparison of these vehicles and the "Jeffery," which the French also class as a "tractor," is made in the table herewith.

The French tractors are fitted either with a capstan or windlass at the rear, operated by power from the motor, which enables them to do a wide variety of work as portable hoist engines, and also gives them the means of hauling themselves or their trailers by means of tackle

through difficult ground and up grades which would be too steep for direct traction.



Specifications and Characteristics of Four Road Tractors

Make	Panhard	Latil	Renault	Jeffery
Bore (in.)	4.134	4.724	5.118	4.257
Stroke	5.519	6.299	6.99	5.5
Normal speed (revolutions per minute)	1,000	1,000	1,000	1,250
Power at this speed	38 H.P.	45 H.P.	48 H.P.	38 H.P.
Speed in miles per hour corresponding to this engine speed:				
Lowest gear	1.19	1.19	1.59	2.41
Highest gear	9.98	11.04	9.70	7.03
Tangential effort at rim of wheels assuming an efficiency of 75 per cent (in lb.):				
Lowest gear	8,150	10,145	8,380	4,240
Highest gear	2,690	1,920	1,353	1,474
Maximum grade negotiable in first gear by traction only (loaded)	51%	54%	39%	39%
Weight in lb.: Empty:				
Front axle	4,906	6,930	7,084	2,640
Rear axle	5,324	5,830	8,316	3,234
Total	10,230	12,760	15,400	5,874
Loaded:				
Front axle	6,182	7,612	8,316	4,444
Rear axle	10,098	9,548	11,924	5,434
Total	6,280	17,160	20,240	9,878
Traction at hook, limited by the adherence (0.5), lb.:				
Empty	4,917	6,600	7,700	2,937
Loaded	8,140	8,800	9,900	4,939
Height of the draw hook above the ground (ft.)	2.99	2.52	2.88	2.72
Strength of spring of hook (lb.)		11,000	6,600	
External diameter of minimum turn of tractor (ft.)	49.20	32.80	45.92	52.48
Width of truck (outside edge of tire) (in.)	77.75	79.52	74.80	64.56
Diameter of wheels (outside of tires) (in.)	39.37	44.88	44.90	35.43
Spacing of axles (in.)	107.05	107.06	140.97	124.01
Body dimensions:				
Height, exterior (in.)	113.77	114.96	115.35	113.75
Length, exterior (in.)	144.48	163.54	125.98	189.36
Width, exterior (in.)	78.74	82.67	88.58	73.33
Overall dimensions:				
Length (in.)	192.91	216.53	216.55	196.85
Width (in.)	78.74	82.67	88.58	72.04

Employers Have Serious Task In Present Labor Situation

Much of the present unrest in labor circles is due to misinformation and misapprehension, according to Mr. Tipper, and he points out that this puts the problem squarely to the employer, who must take up the duty of setting matters squarely and fairly before his staff. The platforms of the labor leaders are too ambitious and too well thought out to be ignored, Mr. Tipper points out

By Harry Tipper

THE months which have passed since the conditions in the labor field were so materially changed have shown an increased tendency on the part of many organizations of workers to introduce further demands. In July the strikes were very frequent and indicated that the radical element in the occupational organizations was able to seize control of the machinery of the organization for the time being. In some instances wiser counsels prevailed after the strike was called and the older control reinstated.

Perhaps the most violent stampede in this direction was the strike of the electric railway workers in Chicago in the latter part of July, where the meeting, which was called to consider the question of demand, was literally stampeded by the radical minority, the report of the negotiators refused a hearing, a strike vote called for and a strike decided upon without any attempt to listen to the answer of the employers and the conciliation committee to the men's demands.

In the beginning of August the demand of the Four Brotherhoods for Government ownership of the railroads with tripartite representation of the employees, the public and the Government on the directing body and with a very definite plan of action, was again brought to public attention by the action of Labor Leader Stone in his letter to the President, which occupied front page space in most of the Sunday papers of August 3 and most of the newspapers several of the following days.

The important developments in this respect were the definite character of the plan, which was evidently the result of a very careful study and consideration by the labor unions in question; the rather peremptory tone of the demand, which was not even made in the way of a suggestion but which was put forward as a demand from these unions and which included a suggestion of their intention to force the question into politics, if necessary, making it a part of the next presidential election.

This action parallels somewhat closely the action of the triple alliance in Great Britain in its demand for the governmental ownership of the railroads and other means of transportation in that country. It also parallels the action of the triple alliance in the strong statement which accompanied the demand and in the definite character of the demand. It may be that this parallel is merely a coincidence, but it suggests a close understanding and a close agreement in viewpoint between the leaders of the strong-

est unions in Great Britain and the strong transportation unions in this country.

The discussions of the International Labor Conference called in Amsterdam, which have occurred during this time, have been interesting as indicating the variation of the viewpoint of the labor leaders in various countries, but are not likely to have much bearing upon the situation. The International Labor Congress, which is likely to be called in Washington under the terms of the peace treaty, should be looked to for more important discussions than the present conference and it may be expected that such a meeting will have considerable effect upon the actions of the labor bodies.

In the meantime, the labor uncertainty as to price and output is keeping back development work in some of the more important lines, and is particularly affecting the activity of building construction which is so badly needed in all parts of the country. Contractors are chary of making contracts far in advance because of the difficulty in estimating costs with the present attitude on the part of labor generally and many labor organizations in particular. They find it impossible to consider, with the usual ease, entering upon contracts which are likely to take a year or two to complete, and in many cases they are not willing to estimate on jobs which will require more than six months.

In the group of textile mills at Paterson, N. J., the manufacturers have allowed a 44-hour week, which is equivalent to an 8-hour day with half a day on Saturday, and suggestions have been made in some of the textile trades in New York that the workers should stand out for a 40-hour week. In the meantime the complaints of the workers that wages are not keeping pace with the cost of living continue to be heard.

All these things indicate that the labor unrest is not diminishing. There is no surplus and in many fields of labor there is an actual shortage of skilled workmen to-day. This, of course, puts the workers in the position to demand higher wages with some possibility of success and the demand is being made. The radicals of the labor bodies are continuing their activity and the records of recent strikes indicate that they are able to overpower the conservative element in the occupational unions frequently enough to make the issue very important.

The internal politics in labor organizations, especially the occupational unions, which are formed and affiliated

with the American Federation of Labor, are in a condition almost as confusing as the national politics. It is impossible to estimate the strength of the various parties upon any given question which may come before a labor union.

In some centers the I. W. W. idea of one big industrial union has grown amazingly in the last few months, although the growth has been under the surface and is not apparent without careful study of the labor politics in that section. In other districts the idea has lost some ground and the general situation is quite in favor of the more conservative element of the older occupational unions.

The net result of the unrest—the dissatisfaction with the high cost of living, the Congressional investigation of this matter, the railroad question and other items of the kind—has been to force these industrial questions before the public and to bring them into the political arena whether that is desirable or not.

In Great Britain matters are rapidly reaching the stage where some drastic action will be necessary on the part of the Government or it will be forced out by public dissatisfaction with the present state of affairs. Great Britain depends primarily upon her carrying trade and the export trade for her manufactured goods. The worker shows no disposition to get back to his pre-war production in that country, and the recent development in the coal mining industry, which will limit the possible output of coal unless there is a complete change, will strike at the heart of Great Britain's hold upon the carrying trade.

The expenditure of money by the Government for unemployment doles, for hastily considered reconstruction work, for the continuance of the necessary after-war expenditures of military character and for the addition of other military expenditures, which are being questioned by the opposition parties, will require more borrowing by the Government in order to meet the deficit which will be created. There is a general feeling in Great Britain that radical changes must occur in the situation. There is no general consensus of opinion as to what these changes will be.

The only party which has a definite program before it is the Labor Party and this program itself includes changes which would be extremely radical.

These developments indicate to what an extent the question of the adjustment of the problems of labor and capital overshadow every other question. Industry, as a world-wide matter, is not to-day producing a sufficient amount to take care of all the world-wide necessities and demands required by the scale upon which we are living. The produc-

tion per man has not been increased since the armistice; in fact, it has decreased.

The total population in all the important industrial countries are producing a smaller volume of goods, per unit, of their population. In the meantime, the uncertainty with respect to labor costs and the timidity which has been created by the labor, political and industrial conditions are keeping the industrial progress from moving ahead as far as it must do if we are to have an orderly amount and character of production and distribution.

The public discussions which have occurred indicate that the economic necessities of industry are not understood and that unless a better understanding can be created, the industrial countries are likely to indulge in experiments which will not agree with the fundamental necessities. There is a very grave need for an immediate realization of the necessity for education in economic affairs not only among the workers but also among the middle classes in this country.

The Mayor of New York in a public statement, the other day, said that the city could run the subways on a five-cent fare. This could only be done by seizing the subways without proper compensation to the present stockholders or by taking out of the taxes a sufficient amount to pay the deficit that would be created. Nevertheless, this statement is believed by a very large proportion of the citizens of New York who are convinced that the properties of the public utilities companies in this city would amply make up the difference between the five-cent fare and the necessary expense.

With the demand of the Four Brotherhoods for Government ownership of railroads, this question is brought sharply into the public arena and into the public eye. The question is likely to be brought into the case of other necessities, such as food, and this matter has been opened up by the statement of the Federal Trade Commission.

With a complete lack of knowledge on the part of most voters as to the fundamental economic necessities, it is not to be expected that they will view the situation from the right standpoint and it is to be expected that their demands for relief from the increasing cost will become more insistent.

The situation calls for wise action on the part of employers of labor, who have in their hands the possibility of instituting measures of education and understanding with large bodies of workers where the lesson can be applied so directly to the daily work that its significance can be understood.

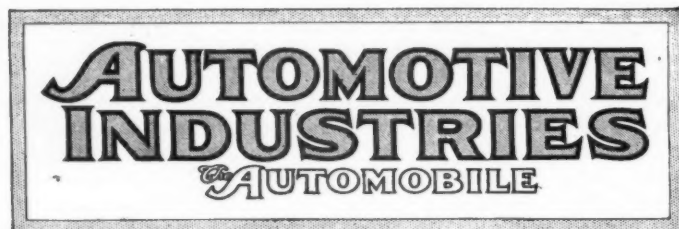
Two New Ocean Cables Proposed

AN effort is being made by American firms with trade interests in the Orient to have a second Pacific cable laid. The present one, from San Francisco through Honolulu, Guam and Yokohama to Shanghai, has become wholly inadequate to meet the demands of the increased business during and since the war, and the average time for a message from San Francisco to Yokohama or Shanghai is now about four days. A committee has been appointed by the National Foreign Trade Council to investigate conditions and urge the present Pacific Cable Company to extend its facilities. Reliable estimates place the cost of another cable in the neighborhood of \$8,000,000, and it is believed that such a cable would soon pay for itself with the increasing trade in the Far East.

Large business interests in the United States and Scan-

dinavian countries are also projecting a cable between New York and Sweden, probably ending in Gothenburg. The congested condition of the Atlantic cables, as well as the increased trade with Norway, Finland and Russia, is responsible to a great extent for the project, but a northern route of communication has badly been needed for some time. The estimated cost of this cable has not been stated.

LIEUT. IBSEN of the Norwegian Army, who recently gave a fine exhibition of flying under adverse conditions at the Copenhagen Aero show, is a grandson of Henrik Ibsen and Bjornson Bjornstjerne, the well-known authors.



PUBLISHED WEEKLY
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Vol. XLI Thursday, September 4, 1919 No. 10

THE CLASS JOURNAL COMPANY

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United States and Mexico One Year, \$3.00
Extra postage west of the Mississippi River on account of Zone Postage Law, 0.50
Canada One Year, 5.00
Foreign Countries One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order or Register your letter.

Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; W. H. Taylor, Treasurer; A. C. Pearson, Secretary.

Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.
Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

The Railroads

THE action of the Four Brotherhoods in demanding of Congress Government ownership of the railroads brings the attention once more to the future trouble that may be expected unless the present deficiency in the railroad system is taken care of by wise and prompt measures. The transportation system, as a whole, is not in good shape. In many towns it is impossible to find parking space for automobiles. The highways are too narrow for the traffic. Street car and other service are inadequate and the larger percentage of such companies is in the hands of receivers. In the meantime the railroad equipment is not being replaced as rapidly as good practice would indicate and the necessary extensions are not being made.

It is of no use to manufacture goods unless they can be transported. It is of no use to make automobiles unless the highways can permit them to travel readily and with sufficient freedom to make their use valuable and economical. This is particularly true of trucks and light delivery wagons which offer possibilities of great relief in the transportation difficul-

ties, provided the roads are of such character that they can be efficiently used.

The automotive field is interested in selling transportation and unless an intelligent view is taken of the railroad difficulty and of the street car difficulty, it is not in the least likely that much attention will be paid to the provision of proper highways or to the extension of landing fields and other equipment which will be required for the airplane and the dirigible.

It is obvious that the manufacturer must learn to use his influence by publicly stating the necessities of the case, not only once but many times, so that at least some measure of interest may reach Congress and aid in its deliberations to the extent that unwise experiments may be deferred and wise construction may be taken.

Tractor Trials

Some years ago, when fuel economy contests interested the car buying public, the point was strongly emphasized that tests of fuel consumption should always be accompanied by acceleration tests. The reason is that the buyer wants not only a car that is economical of fuel but also a lively car—a car with a quick getaway—and the two requirements are rather conflicting. Providing a car with a relatively large engine will improve its accelerating power, but will adversely affect its fuel economy. On the contrary, a small engine tends to give high economy but makes a car "loggy." Now, there is no merit in fitting a small engine to a car if the operating qualities are thereby sacrificed.

Recently a similar situation has arisen in the tractor field. The one big question that seems to interest the tractor buyer is, "Am I getting all the horsepower that I am paying for?" and the natural result is that the manufacturer endeavors to increase his engine power. The way in which this can be done most easily is by increasing the operating speed. Now that passenger car engines are being manufactured to deliver their maximum output at close to 3000 r.p.m., there is no difficulty in designing tractor engines to operate at materially higher speeds than are customary, but the question is, Does it pay?

It can hardly be disputed that, given equal quality of material and workmanship and equal operating conditions, especially as regards the percentage of maximum load normally carried by the engine, the high speed engine will not be as durable as the low speed one. It is, of course, possible, if the high speed engine is of the same dimensions, to operate it at a lower relative load than the low speed engine, and this may equalize the wear and depreciation, but then the question of fuel economy comes up again, for an engine always operates more economically under full throttle than under half throttle.

It will thus be seen that the question of the relative merit of farm tractors is an involved one and does not depend upon any single factor. Of course, the purchaser expects and is entitled to the full rated horsepower, and properly conducted tests to determine the available draw-bar horsepower are useful and desirable. But the fact should not be lost sight of that power output is not the only important characteristic.

Aviation and Government Ownership

TO what extent should the Government enter into active operation of commercial aviation?

This week AUTOMOTIVE INDUSTRIES presents to you in other columns of this issue a description of the British plan for government-owned landing fields. The plan includes specific arrangements wherein the British Government enters into the operation of landing fields and hangars on precisely the same basis as the garage owner conducts his garage in this country.

Rates are defined for storage, for towing, etc., etc. Foreign planes flying into Great Britain must land at these fields and are subject to the various charges.

Although there has been objection to the government-owned fields, the general excuse is "some one had to own the fields, and it might as well be the Government."

This, however, is not sound argument. The problem is not one to be solved by a negative elimination process, but rather by a progressive search for the agency or means that is best equipped for a helpful, constructive program and which will best provide the care and comfort necessary in such work. The question arises, will the flying fields in Great Britain be more efficient and progressive under private ownership regulated by the Government than they will be under direct government ownership?

This question of government ownership and government operation, whether of aircraft or other properties, is an important one in this country and should be given sound consideration before it is answered. At first glance it appears, even to the members of the aeronautic industry, that if the Government would establish fields and commercial routes and operate airplanes until the routes are profitable and can be turned over to private enterprise, that this would be the ideal method of bringing about quick aeronautical progress. But the idea is purely theoretical. It may, perhaps, be best answered by the question: Would the railroads of the United States be the great, vital part of this country to-day if they had been left to government development?

American initiative is greater to-day than it was 100 years ago. American wealth far surpasses the most extravagant conception of the past century.

American initiative and American wealth to-day stand ready, with the proper governmental assistance in the way of federal legislation and regulation, to develop aeronautics, at least to the same degree and perhaps to greater heights than it can be developed by any government-operating plan. Give private enterprise the necessary working tools—sane federal laws, inspection of aircraft for safety by the Government, licenses for pilots, and other necessary regulative measures—and trust it to work out the commercialization of aviation successfully.

Adherents of a government operated commercial aviation may quickly find reason for a change of their views by familiarity with the present operation of the existing government bureaus, where red tape, political appointees, procrastination and sixty-day leaves hold forth.

One would expect to find a large element of national pride entering into this question, as it was American ingenuity that gave the flying machine to the world and it is American initiative that is largely responsible for its development into the present-day advancement. The American plan should be one that will give the most encouragement to American ingenuity and initiative.

Europe Lags Behind In New Production

French and Italian Makers Slow in Marketing Post-War Models

PARIS, Aug. 23 (*Staff Correspondence*)—In the nine months since the armistice went into effect no European automobile manufacturer has attained anything like pre-war output. In most cases, production is at a standstill, although plans are well in advance for large outputs.

As an example typical of the French factories, the Lorraine Dietrich factory, which during the war employed 3000 workers, is running with a staff of 500. This factory put all its energy on aviation engines and has not built an automobile for more than four years. Since the fighting stopped it has been necessary to complete the old aviation program, to get out new designs, to prepare new jigs and tools, and to adjust a strike which, while lasting only one month, delayed production at least twice as long.

Delay Due to Transportation

The delay in production has not been entirely imputable to the automobile factories. Foundries and steel works have been backward and transportation throughout France has been in a disorganized condition.

It must be admitted that the application of the 8-hour day, immediately after the war, came at an inopportune moment. With a factory in full production, the drop from ten to eight hours a day could have been counteracted largely by speeding up, by the elimination of waste time and motion, and by better shop methods generally. But when everything depended on the drafting office, the experimental department and the tool room, it was impossible to gain the two hours lost each day under the new law.

Hispano-Suiza is almost ready to get into production on a new high-class overhead valve six, embodying much aviation practice. The test cars have been on the road for two months. It has not been built to fit any price. Probably Hispano will specialize on this as well as on a smaller six.

Renault Busy on Tractors

While cleaning up war contracts, Renault has been busy on agricultural tractor production and is producing twenty-four of these machines a week. The program consists of three models with four-cylinder engine, and one high-powered six. Big production will be on a 10 hp. four-cylinder model, to be sold complete with lighting and starting, detachable wheels, 5-seater body at \$1,760, calculated at the nominal rate of exchange. Production on this has been promised for October. Renault also has entered the machine tool line and is building shafting and factory

equipment, in addition to featuring a twelve-cylinder aviation engine.

De Dion Bouton, while working on two new eight-cylinder touring cars, is building agricultural tractors and trucks. The company also is making magnetos.

Delage is one of the most advanced on post-war programs, because for two years the factory was kept on staff car production and was therefore able to build a high-class six, which is coming through in regular production.

Berliet has not yet marketed the cheap American-type car that was shown at the Lyons Fair last March. The delay is due, in a certain measure, to a serious fire at the Berliet factory.

Gnome & Rhone Doing Outside Work

The Gnome & Rhone Co. is doing much work for outside firms. The factory is building agricultural tractors for a tractor company, is making an English-designed motorcycle for a French company, and is building sewing machines and Diesel engines and helping in the production of cars for a French firm in which it is financially interested.

Ballot, after cleaning up aviation engine contracts for the French and American governments, is getting back to car engines and will also produce Diesel engines.

Peugeot is not yet in production, but has plans well advanced for a rotary valve six. Darracq, Unic and Charron are all marking time with modified pre-war models to act as a stop-gap until the new types are ready. The Darracq company soon will get into production on a high-class eight-cylinder, V-type engine. Citroen has not yet lived up to the promised program of one hundred cars a day.

No Post-War Cars in Italy

In Italy, not a single post-war car is in production. Fiat is the most advanced and, within another month, doubtless will be in regular production on a new, light four-cylinder, 5-passenger car. This will be followed by a six and by a four-passenger machine of the same bore and stroke. In the meantime, the factory is turning out a limited number of war-type cars and has increased agricultural tractor production to ten machines per day.

Lancia is completing war contracts and building war-type cars. Plans are ready, however, for a new multi-cylinder model.

Italy is laboring under difficulties, owing to a hampering rate of exchange and the high cost of coal. The factories now are paying \$86 a ton for coal dust. There has been some labor trouble but not of such long duration as in France.

An indication of the importance attached to automobiles in any labor disturbance was furnished at Turin a short time ago. A general strike threatening, the military authorities ordered every motor vehicle, from a motorcycle to a tractor, to be handed over to them. The police served individual notice on all owners, and, if the machine was not inside the park by the appointed hour

White to Make New Car at Indianapolis

DETROIT, Sept. 2—D. McCall White, who is designing a car here, will manufacture it at Indianapolis. It has been reported that he has obtained the plant formerly occupied by the Stenotype concern at Indianapolis, and will go there in a short time with complete plans for manufacture.

According to present information White is backed by the Nash interests, and intends to manufacture on an extensive scale, the first year's production being aimed at somewhere near 10,000 cars. The cars will probably sell for \$4,500 or \$5,000.

Among the members of White's organization are S. C. Howard, in charge of sales; Leo N. Burnett, advertising manager, and Edwin W. Goodwin, body engineer. These men were all formerly in similar positions in the Cadillac organization.

No New Packard Six For Several Months

DETROIT, Sept. 2—No announcement concerning the marketing of a six-cylinder car by the Packard Motor Car Co. is pending in the immediate future. If such a car is to be built by the Packard company it is still in the formative stage, company officials say, and its appearance is a matter of months, if not of years.

It is generally known in the industry that the Packard company has been working on a new model, but company officials can see no reason why this should cause the circulation of new car rumors, inasmuch as the engineering department has conducted such experimental work for years. The company now has a number of experimental cars in its shops, ranging from four-cylinder machines to models in which sixteen-cylinder engines have been installed.

It was rumored here this week that when the Packard company places a six-cylinder car on the market it will discontinue the manufacture of the twin-six. This was positively denied at the plant. The company states it will never discontinue the manufacture of the twin-six machine, whether or not it brings out new models. Packard production is now about 750 cars monthly.

it was forcibly seized. If an automobile was reported to be under repair and immovable, the magneto had to be handed over to the military authorities. This regulation applied not only to privately owned cars, but to service vehicles attached to the Turin factories.

Excepting a few who possessed spare magnetos, not a single automobile owner retained possession of his car on the day of the general strike. Armored military cars patrolled the streets and the day appointed for the strike proved to be one of the duller in the history of the city.

British Standardize Tire and Rim Sizes

Reduction to Five Rim and Ten Pneumatic Tire Sizes Is Effected

LONDON, Aug. 20 (*Special Correspondence*)—Revolutionary action has been taken by British tire manufacturers in reducing the number of standard sizes of pneumatic tires to ten and of standard rims to five. These standard sizes only will be supplied for new equipment, but other sizes will be furnished in limited numbers for replacement purposes. That this decision is a drastic one is evident when it is considered that formerly there were approximately fifty sizes listed.

There are two features of interest in connection with the new standard sizes. One of these is the apparent disappearance of the 90 mm. tire; perhaps the most popular of all in pre-war days. The other is the substitution of inches for millimeters in what are now the 30 x 3½ and the 31 x 4 sizes. The latter illustrates the influence of the Ford, inch tire replacements having become sufficiently profitable to the tire makers to cause them to install the necessary moulds and equipment.

All the new tires are of ordinary clincher type and are used, as is the custom in Europe, with security bolts. Table of sizes follows:

Nominal Size of Tire	Rim Required
30 x 3½ in.	.....30 x 3½ in.
31 x 4 in.	
815 x 105 mm.	.....815 x 105 mm.
815 x 120 mm.	
820 x 120 mm.	.....820 x 120 mm.
820 x 135 mm.	
880 x 120 mm.	.....880 x 120 mm.
880 x 135 mm.	
895 x 135 mm.	.....895 x 135 mm.
895 x 150 mm.	

Oil Interests Plan Research Program

NEW YORK, Sept. 3—Establishment of a central research and testing laboratory for the study of problems arising in the oil industry is planned through action just taken by the directors of the American Petroleum Institute. Plans for the institution call for co-operation with the automotive industry and follow closely upon the recent meeting here of a joint fuel and automotive committee.

Announcement of the research laboratory was made here to-day by Robert L. Welch, general secretary of the petroleum institute. The plan was approved last week at the meeting of the institute directors at Colorado Springs, Col., and a committee was appointed to work for its establishment. Although details of the financing were not completed, the body approved general plans for an expenditure of a sum approaching \$1,000,000 for the contemplated work.

The laboratory will have for its chief purpose the study of all problems relating to the production, distribution and consumption of oil and gas. However, a large part of its work, following the program of the joint meeting here, will be devoted to the special problems of the automotive industry.

The committee for this project consists of Henry L. Doherty, of New York; Walter C. Teagle, president of the Standard Oil Co. of New Jersey; Dr. Van H. Manning, director of the Federal Bureau of Mines, and Welch.

Will Announce New Excise Tax Rulings

NEW YORK, Sept. 3—Revision and changes in the methods of administration of the Federal excise tax on automotive parts and accessory is expected to be announced soon by the Bureau of Internal Revenue of the Treasury Department. This belief, expressed here to-day, was based upon the outcome of recent conferences at Washington between officials of the bureau and officers of the National Automobile Chamber of Commerce and of the Motor and Accessory Manufacturers' Association.

Permanent co-operation between the bureau and the automotive organizations in the levy of the tax was promised in the announcement to-day by the accessory association. In this, it was stated that the tax regulations have been made contrary, in many details, to the trade practice and that James M. Baker, deputy commissioner of the bureau, who now is in charge of the collection of this tax, had agreed to advise with men of the automotive industry in future regulations.

The announcement to-day revealed that strong efforts have been made by the two organizations to remedy the disagreeable features of the tax administration. Further conferences will be held, although some changes in the regulations are expected within a short time.

ON WAY IN MARTIN BOMBER

WASHINGTON, Sept. 2—The War Department authorizes publication of the following statement from the Director of the Air Service:

After a delay at Plattsburg, N. Y., due to necessary repairs, Col. R. S. Hartz, of the Army Air Service, has again taken the air in a Martin bomber in his trip around the United States. He flew from Plattsburg to Buffalo, a distance of 326 miles, in five hours, with one stop for gas.

FRENCH OIL IMPORT DUTY

WASHINGTON, Sept. 2—A French law, dated Aug. 5, provides that mineral-oil residues for combustion motors and road construction are dutiable at 0.80 franc per 100 kilos, net, general tariff and 0.40 franc per 100 kilos, net, minimum tariff, according to a cable from Commercial Attache C. D. Snow at Paris under date of Aug. 22.

Details Revealed of Wilys Corporation

New Six Will Be Built by Duesenberg—Finance Plan Announced

NEW YORK, Sept. 4—Further details of the make-up of the Willys Corp., announcements of which previously have appeared in AUTOMOTIVE INDUSTRIES, were made public here to-day by officials of the new company. These revealed that the proposed new six-cylinder car would be manufactured at the plant of the Duesenberg Motors Corp., at Elizabeth, N. J., and that the single chassis to be built would embody many of the features of the new Overland four, which is just getting into production at Toledo.

The corporation, according to to-day's announcement, "will permit the further expansion of the Electric Auto-Lite Corp. of Toledo; the New Process Gear Corp., of Syracuse, N. Y., and the properties of the Duesenberg Motors Corp. The new corporation also will own securities of the Willys-Overland Co., the Fisk and Federal rubber companies, the Bridgeport Crucible and other corporations."

The capitalization will consist of \$15,000,000 cumulative 8 per cent first preferred stock, \$10,000,000 cumulative 7 per cent second preferred stock and 5,000,000 shares of common stock, of no par value.

"The Willys Corp. has made a contract with the Willys-Overland Co. whereby the latter will market the new six, organizing a separate sales unit for this purpose," the announcement continues. "This contract extends over a period of years. Both the Auto-Lite and the Gear corporations will continue as distinct units and will not in any way lose their identities in the new corporation. The general automobile parts business of both units will be continued and expanded."

Napier Engined Airco Awarded British Record

LONDON, Aug. 20 (*Special Correspondence*)—The Royal Aero Club has accepted as a British record for a closed circuit the speed of 129.3 m.p.h. attained by Captain Gathergood when he won the Aerial Derby with an Airco machine fitted with a Napier engine.

The Aerial Derby course for this year's race was the same as that of the before-the-war contests, with the exception that the course around greater London was covered twice instead of once.

ZENITH FACTORY FOR CLEVELAND

CLEVELAND, Aug. 30—An automobile tire factory, to be known as the Zenith Tire & Rubber Co., and capitalized at \$10,000,000, is to be erected in this city. A tract of 200 acres has been purchased and plans drawn.

General Motors Has Home Owning Plan

Details Announced — Advance
\$800 to Worker—Four
Plans Given Out

PONTIAC, MICH., Aug. 29—Active operation of the new housing plan of the General Motors Corp. has commenced here. Employees are able to buy homes through advantageous financial aid from the company, either on the tract of land adjacent to the Oakland Motor Car Co. plant or elsewhere in the vicinity.

An advance of \$800 is made to the worker, for his first financing, and he is expected to make an initial payment of five per cent of the selling price of the home. He then is expected to turn over twenty-five per cent of his salary to pay off the indebtedness.

Following are the three home buying plans effective immediately and a fourth plan for the future:

1—Employees may purchase one of the homes built by the Modern Housing Corp. on the tract north of the Oakland property;

2—They may purchase a home built by an outside builder under certain definite conditions;

3—They may arrange to build on their own lot and receive assistance from the General Motors Corp., obtaining the benefit not alone of the financial help but also of the advice of company engineers who will check over bids of contractors to determine that the builder is getting a fair return for his money.

4—Commencing with the opening of the building season next year, employees may arrange to have the housing corporation build their homes to their own plans.

The fourth plan was announced in detail this week but because the Modern Housing Corp. will be rushed during the balance of the year it will not be possible to divert its building activities from the system of standardized quantity production of houses until the first quota has been built.

Houses to Be From \$3,500 to \$8,500

The value of houses eligible to bring corporation assistance for the buyer will be from \$3,500 to \$8,500. This range covers the values of houses being built by the Housing Corporation and will apply also to outside purchases of building plans in which the corporation lends aid.

The corporation requires that twenty-five per cent of an employee's yearly salary be devoted to paying for his property. The plan provides, also, that in case an individual's yearly earnings are not sufficient to enable him to participate in the corporation's savings fund plan and in the home purchase plan as well, an arrangement may be made whereby the money turned into the savings fund will be applied upon the purchase of the home without loss of any

of the benefits of the savings plan to the employee.

Additional payments above the required percentage will be permitted at any time and the buyer will receive a warranty deed and certificate of title as soon as he has completed payments or when he has reduced the sum to a figure where the home can be mortgaged for the remaining indebtedness.

Five Styles of Houses

Five styles of houses ranging in price from \$3,500 to \$8,500 are now being built on the 700-acre tract north of the Oakland factory by the Housing Corporation. There are four, five and six-room bungalows and seven and eight room houses, all but twenty-five being of either brick or stucco and hollow tile construction. Twenty-five of the homes, the first to be built on the addition, are of frame. The houses are varied in design and are complete in every detail. The purchase price will include kitchen range and gas hot water heater, in addition to furnace, electric lights and other modern conveniences. The streets in the plot will be paved, sidewalks laid and trees planted.

Following is the company's announcement:

"Each employee buying his home from the Modern Housing Corp., costing anywhere from \$3,500 to \$8,500, will have paid for him by the General Motors Corp., to be used as part of his first payment, the sum of \$800. He will not be charged any interest on this sum. As compensation for this advance, the General Motors Corp. will ask each buyer to agree that, in case he shall resign or be discharged from its employ or die within five years from the date of his contract of purchase, that the company, within thirty days after learning of his death or after the happening of either of the other events, shall have the privilege of buying his home and of paying for it by crediting him with all payments made (not including the \$800 advanced by the company) for principal, interest, taxes, assessments and insurance.

"He will be charged with a sum equal to rent at the rate of ten per cent per annum on the selling price mentioned in the contract from the date of the contract, no deductions being made for depreciation, and no interest being allowed on either side of the statement, the balance being paid to whichever party is entitled to it. The result will be that the buyer will simply have paid rent during the period of his occupancy of the home, which is what he would have done had he made no contract of purchase, and he will be relieved of the contract.

Purchase from Corporation

"The General Motors Corp. will advance \$800 to any employee desirous of buying a home for his own occupancy in either Flint or Pontiac, even if the home is not to be bought from the Modern Housing Corp., provided it is worth from \$3,500 to \$8,500. Although the idea will be to render the same amount of assistance and in the manner mentioned as is given purchases from the housing corporation, the arrangement must be somewhat different. For this reason it is difficult precisely to formulate in advance the exact terms of the arrangement to be made. Each case of this nature will be considered on its merits, with the idea of treating the employee with fairness and upon terms of equality with other employees purchasing homes from the Modern Housing Corp.

"The employee may submit his plans and specifications for approval. He will then submit bids from at least two independent contractors, and these bids will be checked up by the engineering department as to fairness of price.

"First Payment.—Where the home is bought from the Modern Housing Corp., in addition to the \$800 to be advanced by the General Motors Corp., the buyer will be expected to make a minimum cash payment of five per cent of the selling price. To accommodate those who have put their savings into Liberty Bonds, the company will take these bonds at the market price.

Elkhart Reduces Hours and Introduces Bonus

ELKHART, IND., Sept. 2—Beginning yesterday and continuing until Mar. 1, 1920, the Elkhart Carriage & Motor Car Co. will operate its plant fifty hours per week, paying on the same wage scale as for sixty hours. The change in policy is experimental and will be reviewed on March 1 to see if it will be continued. This plan affects directly only employees working by the day, but indirectly it will prove equally satisfactory to piece workers.

At the same time a co-operative dividend plan is being arranged, payable for the year ending Nov. 1, and affecting all employees who have been with the company six months or more, computed on earnings and a seniority basis. The dividends at present will be paid in preferred stock of the company, which bears 7 per cent interest, payable semi-annually; or else in preferred stock and cash.

No sale of this stock by employees to outside persons will be authorized or recognized, as the distribution of the stock is for the purpose of giving employees a tangible and direct interest in the business. The company will arrange to make employees loans on this stock if special need arises, and it will also agree to redeem at par and accrued interest the stock of any employee leaving its service.

The company has undertaken this scheme voluntarily in the hope that "on a basis of mutual confidence and respect there may be developed in this institution a genuine spirit of co-operation, so that we may all work together with like interest and mutual pride in the quality of our product, and a common satisfaction with the conditions under which we work together, and that we may share on a fair basis the returns that such co-operation may bring."

Must Pay 25 Per Cent

"Monthly Payments.—The buyer will be required to devote twenty-five per cent of his earnings each year to payments of principal, interest, taxes and fire insurance on his home until it is fully paid for. After deducting the estimated cost of taxes and fire insurance, the balance of the twenty-five per cent will be divided into twelve equal parts, which will represent his twelve installments falling due each year. Each of these monthly installments will pay not only the interest on the total indebtedness incurred by the contract of purchase, but also a portion of the principal of the debt.

"Paying for Taxes and Fire Insurance.—The purchaser, of course, will pay his own taxes and fire insurance.

"Additional Payments.—Any purchaser can pay off the indebtedness on his home faster than the agreed rate if he wishes to do so. But, in order to discharge the indebtedness in full and receive the deed within the five-year period already mentioned, he will be expected to repay the \$800 advanced.

"Beginning next season, a fourth plan, which follows, for the construction and sale of houses to employees on special designs of the buyers and on lots bought from a third party is expected to become effective:

"The housing corporation will itself build houses on special plans of employees and for their own occupancy, in either Flint or Pontiac, on lots bought from it or from a third party, provided the location and the price are approved, and the premises are not more than one-half mile from the present building operations, and if the homes are to be of the value of from \$3,500 to \$8,500 each."

Liberty Engines Fastest In Race

Army Fliers Take First Places for Speed in New York-Toronto Flight

NEW YORK, Sept. 2—De Haviland planes, equipped with Liberty engines, and piloted by army fliers, ran away, in speed, from the other sixteen makes of planes in the round-trip New York-Toronto aerial race held last week. This was revealed in the official announcement of the flying times and the results of each of the fifty-two entrants, by the American Flying Club, promoter of the race. The De Haviland and Liberty combination placed the first five winners, with a Le Pere finishing sixth, for speed.

Further awards, based on load carrying ability and performance, are yet to be given out. The results here given consider no factor other than speed, not taking into account size, weight, load or engine power. Complicated calculations are necessary before the final standings can be obtained and several days may elapse before the records are completed.

Lieut. Maynard Speed Winner

The speed winner was Lieut. B. W. Maynard, who was an army test pilot at Romorantin, France, during the war. His plane made the 1042 miles of the round trip, with the necessary controlled stops at Syracuse, Albany and Buffalo, in a total of 465½ minutes. He made the flight without any readjustments to his motor and kept it at a uniform speed of 1825 r.p.m. The fastest leg of his round-trip was the 146 miles between Buffalo and Syracuse, made in 56½ minutes.

Maynard was almost an hour ahead of his nearest competitor, Lieut. H. H. George, who flew a similar machine, and made the circuit in 520¾ minutes. George was an army ace although he did not reach the front until seven days before the armistice went into effect. Third was Lieut. D. B. Gish. The other results are shown in the accompanying table.

Nineteen De Haviland planes, Liberty engined, were entered in the race and all except five completed the course. It was announced that eleven of these engines had been run steadily for 110 hours before going into the race.

Rohlfs Best Civilian

The civilian flier who made the best time was Roland Rohlfs, test pilot for the Curtiss Aeroplane & Motor Corp., who finished seventeenth in an Oriole, that made the circuit in 667¼ minutes. Performance of the Fokkers did not bear out the claims that have been made for them by their German makers. Two of these scout planes were the only enemy planes entered in the race and both finished far down the list, one in eighteenth place and the other in twenty-seventh.

Fifty-two planes, representing seven-

Speeds of the New York-Toronto Air Racers

The order in which the contestants finished was announced officially as follows:

Plane	Name	Start From	Flying Time
DH-4	Lieut. B. W. Maynard	Mineola	465½
DH-4	Lieut. H. H. George	Toronto	520¾
DH-4	Lieut. D. B. Gish	Mineola (penalty 21)	524¼
DH-4	Col. G. C. Brant	Mineola	545¼
DH-4	Lieut. M. J. Plumb	Mineola	559¾
Le Pere	Lieut. P. H. Logan	Mineola	562
DH-4	Lieut. Ben Adams	Mineola	564
DH-4	Lieut. John P. Roullot	Mineola	570¼
VE-7	Maj. R. Schroeder	Toronto	572
DH-9	Sgt. C. B. Coombs	Toronto	576
SE-5A	Lieut. Col. H. E. Hartney	Mineola	589¾
DH-4	Lieut. R. T. Midkiff	Mineola	597½
DH-4	Lieut. Ross Kirkpatrick	Mineola	602¼
DH-4	Lieut. C. F. Brown	Mineola (penalty 48)	607¾
SE-5A	Lieut. Charles Colt	Mineola	621½
DH-4	Lieut. F. T. Honsinger	Mineola	635
Oriole	Roland Rohlfs	Toronto	667¼
Fokker	Capt. C. W. Cook	Toronto (penalty 90)	759½
DH-4	Maj. A. B. Gillespie	Mineola	764¼
JN-4D	C. S. Jones	Toronto	833¼
JN-4H	Lieut. W. R. Taylor	Mineola	836¼
JN-4H	Capt. H. B. Chandler	Mineola	895¼
JN-4D	Capt. R. H. Depew	Mineola	898¼
Can. JN-4	Capt. S. S. Moore	Toronto	912½
Can. Trng	Lieut. L. W. Bertaud	Mineola	1285¼
JN-4H	Lieut. Wallace Young	Toronto (penalty 60)	1313¼
Fokker	Col. William C. Barker	Toronto	1434¼
Can. JN-4	Lieut. C. A. Schiller	Toronto	1520¾
DH-4	Maj. J. W. Simons	Toronto	1536¾
Standard	O. S. Farmer	Toronto	3323

The following did not finish the race:

DH-4	Capt. A. E. Simonian	Disqualified.
Oriole	Lieut. Acosta	Disqualified.
Caproni	Lieut. P. Melville	Out at Toronto.
Le Pere	Col. H. E. Hartney	Out at Buffalo.
DH-4	Maj. J. W. Simons	Out at Toronto.
JN-4H	Lieut. U. G. Jones	Out at Knoxville, N. Y.
L W F	Capt. J. M. Foote	Crashed at Binghamton, N. Y.
L W F	Maj. Elliott Springs	Out at Batavia, N. Y.
DH-4	Col. H. B. Claggett	Crashed at Albany, N. Y.
SE-5	Capt. J. O. Donaldson	Out of race.
SE-5	Capt. H. W. Smith	Out at Buffalo, N. Y.
Oriole	J. D. Hill	Crashed at Albany, N. Y.
SE-5	Capt. F. W. Steinle	Withdraw.
SE-5	Capt. R. W. Brown	Crashed.
SE-5	Capt. F. B. Kindley	Crashed at Albany, N. Y.
JN-4D	Maj. J. L. Lyons	Out at Poughkeepsie, N. Y.
Avro	Lawrence B. Sperry	Out of race.
DH-4	Capt. C. H. Reynolds	Out at Troy, N. Y.
S V A	Austin B. Crehore	Crashed at Albany, N. Y.
DH-4	Lieut. C. S. Osborne	Out of race.
DH-4	Lieut. H. T. Slater	Flew home to Selfridge Field, Mich.
DH-4-9	Col. L. L. Breterton	Out of race.

teen makes, started in the race, while thirty completed it. The remainder were forced out because of many reasons.

Possibilities in the commercial field for the airplane were evidenced by the ease and comparative lack of accidents that marked the running of the race. Although the fliers braved the varying weather conditions, from sunny skies to thunderstorms and heavy winds, only two accidents caused injuries to the pilots. One befell Lieut. Austin Crehore, who broke an arm when he crashed into a tree at Albany, while the other severely bruised was Captain F. B. Kindley, who drove his SE-5 over an embankment in preference to harming spectators who had swarmed on the field at the same place.

SOUTH AFRICAN AIR SERVICE

NEW YORK, Aug. 30—Cable advices reaching here from British South Africa were that an aerial service was planned between Capetown and Cairo. Parties of British officers are said to have gone to Africa to survey the route and to lay out landing grounds.

AIRPLANES FOR ARGENTINA

WASHINGTON, Sept. 2—The Argentine Government is interested in the acquisition of hydroplanes for possible mail service, according to a cable received by the Department of State from the Third

Secretary of the American Embassy in Buenos Aires. But few hydroplanes have been exhibited there and those shown have proved unsatisfactory. The European missions are making exhibition flights in Argentina.

DISCONTINUE AVIATION ENLISTMENTS

WASHINGTON, Sept. 2—Enlistments for the Air Service have been discontinued in accordance with instructions issued by the War Department.

BELGIANS BUY TOOLS HERE

WASHINGTON, Sept. 2—Empowered to purchase machine tools valued at \$5,000,000, a commission representing the Belgian Government is touring the industrial centers of this country preparatory to obtaining the equipment. The trip is being made under the guidance of the War Department, most of the purchases being made from the surplus stock of the department. The tools to be bought now were said to be for samples, further large purchases being expected later. The director of the commission is M. O. V. Jeanjean, the other members being Charles Heuze, Henri Krebs and Arthur Servaia. Low prices made for the same goods by German concerns have been turned down for patriotic reasons, one of the commission declared.

Seven Speed Winners in New York-Toronto Air Race



"Taking off" in the race. The De Haviland 4 with 400-hp. Liberty engine, piloted by Lieut. B. W. Maynard, which made the speed record in the race



The De Haviland 4, No. 11, piloted by Lieut. H. H. George, made second place



Col. G. C. Brandt (right), Lieut. Hubbard (left). Col. Brandt finished fourth



Lieut. Dan B. Gish came in third



Lieut. M. J. Plumb (right), first contestant to complete circuit, is showing his mechanic, Sgt. Kratz, his good luck tokens. He finished in fifth place

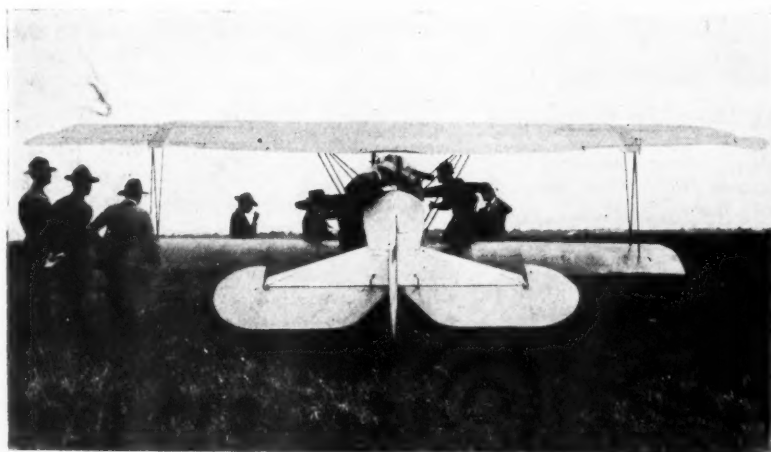


Lieut. Patrick Logan in a Le Pere plane with a 400-hp. Liberty engine finished in sixth place

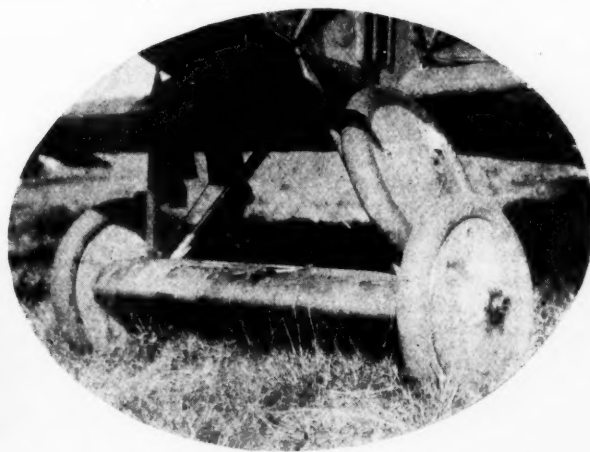


The De Haviland 4 driven by Lieut. Ben Adams made seventh place for speed

Pictures of Interest in the New York-Toronto Race



Col. William A. Barker, V. C., getting ready to leave the Roosevelt Field, Mineola, N. Y., control for the return trip to Toronto in the aerial classic put on by the American Flying Club



Col. William A. Barker's captured German Fokker, showing spare extra wheel for emergency purposes lashed to chassis



C. M. Vought, chairman of the Contest Committee in charge of the race



Col. Archie Miller and a U. S. air mail pilot with mail from Toronto, Canada



Left to right, C. M. Vought, chairman of the Contest Committee; Capt. Charles Trail, aide to the British air attaché; Lieut. Col. William C. Sherman, chief of training; Maj. Gen. Charles T. Menoher, chief of Air Service; Col. Archie Miller, commander of Long Island air activities; La Tourette Driggs, president of the American Flying Club; Col. J. D. Carmody, commanding officer at Roosevelt Field; A. L. Hanstetter, official

Nebraska Approves State Tractor Test

University Engineers Outline Official Tests for Farm Tractors Under New Legislation

LINCOLN, NEB., Aug. 29—Arising out of the two bills passed during the last session of the Nebraska legislature, whereby it was enacted that no farm tractor shall be sold in the state until it had passed an official test and, further, that any sale of such tractor be void unless the necessary supplies and repair parts were carried at some point within the state; the board of tractor test engineers (Professors L. W. Chase, O. W. Sjogran and E. E. Brackett) has approved the following outline for tests to be made under the state law.

Complete Test Rules

The complete test consists of the following:

- (a) Drawbar work at from one-third to full load for 12 hr. This test gives opportunity for the tractor to limber up.
 - (b) Brake horsepower test at rated load and rated speed for 2 hr. This test is to show whether or not the tractor will carry its rated load on the belt; also to show fuel consumption at rated load.
 - (c) Brake horsepower test at load varying from maximum to no load with all engine adjustments as in test (b) for 1 hr. This will show fuel consumption and speed control on varying load.
 - (d) Brake horsepower test at maximum load for 1 hr. with governor set as in test (b) and carburetor adjusted to give maximum power. This will show maximum horsepower of tractor on the belt.
 - (e) Brake horsepower test at one-half load for 1 hr. with governor set as in test (b) and carburetor adjusted for most economical operation at one-half load. This test will show fuel consumption at one-half load.
 - (f) Drawbar horsepower test at rated load for 10 hr. This will be made on a half-mile cinder track and will show whether or not the tractor will carry its rated drawbar load continuously. It will also show fuel consumption on drawbar work.
 - (g) Maximum drawbar horsepower test. This test will be a series of 50-ft. runs with an increase of load for each run until the engine is overloaded or the drivewheels slip excessively.
 - (h) Miscellaneous. This may include investigation of work on inclines, turning radius, effectiveness of brakes or any other feature of the tractor which may seem to require special observation.
 - (i) Tractor will run under observation for endurance throughout the complete test outlined above.
- All of the tests will be run at the University Farm, Lincoln, Neb. University employees will operate the tractors in all but the limbering up run (a).
- Record of fuel consumption will be kept in both belt and drawbar tests.
- Brake tests will be made with a Sprague electric dynamometer of 150 hp., to which the tractor under test will be belted.

A half-mile cinder track is being constructed for the drawbar tests and it is hoped to maintain this track in nearly uniform condition so as always to be fair.

In the drawbar tests the tractors will pull a dynamometer car or loading machine consisting of a 3-speed Illinois tractor chassis with an electric generator mounted in place of the engine and driven by power from the traction wheels of this chassis. The load can be adjusted by controlling the current in the generator. This loading machine will be pulled through a Gulley traction dynamometer that will make a record of drawbar pull, distance and time.

It is probable that the official testing will begin early in October; but this will depend on whether the cinder track and the drawbar loading machine prove satisfactory in preliminary tests.

New Marmon Additions Will Double Capacity

INDIANAPOLIS, Aug. 30—Nordyke & Marmon Co.'s new No. 3 plant, consisting of a five-story body shop 600 ft. long, a one-story final assembly building 900 ft. long and a power plant and other buildings, is being rushed to completion.

This new addition to the Nordyke & Marmon Co. works practically duplicates in floor space the huge machine shop built during the war for the production of U. S. Government aviation motors. The No. 2 plant, which was erected in the summer and fall of 1917, a one-story building, approximately 600 ft. square, will be devoted entirely to machine shop work.

According to the latest plans, a portion of the plant expansion will be completed during the early fall and will be placed in production shortly after completion, giving the company facilities which will enable it to double its output.

There will be an aggregate of more than 300,000 sq. ft. of floor space in the new building. Five floors of the building 600 ft. long will be used for body manufacturing and the facilities will enable the company to manufacture all of its closed bodies, as well as bodies for open cars. The buildings are fireproof, the body plant being of a poured, reinforced concrete, while the long final assembly plant is of steel and brick.

DECREASE IN AIR SERVICE

WASHINGTON, Aug. 29—The organization of the Air Service has decreased 91 per cent since the armistice was signed. Of 195,023 officers and men in the service on Nov. 11, 1918, but 16,991 remain, of which 3426 are officers. Of the 15,646 commissioned officers discharged, 1638 flying and 1524 non-flying have entered the Reserve, 20 per cent of the number discharged.

Since April 1, 10,000 hr. not chargeable to training have been flown at United States Flying Fields, with thirty-seven fatalities. This shows a high fatality rate of 269 hr. per fatality as compared with 3149 hr. per fatality for all flying during the last five months of the war.

U. S. LAND FOR OIL

WASHINGTON, Aug. 30—A bill has been introduced by Senator Smoot to promote the development of oil lands in national forests, but excluding those in national parks or lands withdrawn for military or naval use. The bill would authorize the Secretary of the Interior to grant permits to individuals to prospect for oil on land of not more than 2,560 acres for a period of two years.

Iowa Motor Show Draws Record Crowds

DES MOINES, IOWA, Aug. 29—The annual motor show held here in connection with the Iowa State Fair during the last ten days has drawn the biggest crowd that any motor show ever attracted in Iowa. As it was entirely free to the public, it was impossible to obtain any accurate attendance figures, but C. G. Van Vliet, the show manager, estimated that at least 250,000 persons saw it.

The motor exhibit was handled by the state fair association in close co-operation with the Des Moines Automobile Dealers Association and the Des Moines Motor Truck Dealers Association. C. G. Van Vliet, one of the managers of the winter show, was in charge and was assisted in the management by Don Chamberlain, secretary of the truck dealers' association.

It was held in Machinery Hall. Three-fifths of the hall was used for automobile exhibits. Each exhibitor's space was 600 sq. ft.

Cars and Trucks on Display

There were forty-three passenger car lines exhibited, with seventy-eight cars on display. The motor truck exhibit almost equalled the showing of passenger cars with thirty-eight lines shown and a total number of sixty-six models. Nineteen exhibits of automotive equipment were shown. Only five tractors were on display in the hall, the greater number of tractor dealers having their exhibits in the open air.

The Bell, an Iowa made truck not previously shown in Des Moines, is made by the Iowa Motor Truck Co., of Ottumwa.

The passenger cars shown at the Des Moines show were the American Beauty, Peerless, Milburn Electric, Roamer, Chevrolet, Stephens, Moon, Haynes, Briscoe, Paige, Hupmobile, Liberty, Aperson, Essex, Hudson, Overland, Reo, Dodge, Jordan, Velie, Allen, Auburn, Maxwell, Scripps-Booth, Dort, Crow-Elkhart, Mitchell, Elcar, Nash, Dixie Flyer, Chalmers, Elgin, Studebaker, Oldsmobile, Cole, Chandler, Cleveland, Columbia, Davis, Franklin, Saxon, Monroe and Hollier.

The trucks shown were the Gary, Chevrolet, Master, Clydesdale, Briscoe, Packard, Commerce, Denby, Autocar, Reo, Standard, G. M. C., Stewart, Traffic, Maxwell, Defiance, Bell, All-American, Gramm-Bernstein, I. H. C., Independent, Bethlehem, Selden, Pierce-Arrow, Republic, Nash, Federal, Rainier, Panhard, Oldsmobile, Dort, Beck, Mack, Winther, Oneida and White.

ILLINOIS MANUFACTURERS MEET

CHICAGO, Aug. 30—A conference to discuss present problems and give opportunity for free and full expressions of opinion for their solution and legislation has been called by the Illinois Manufacturers' Association, to be held Sept. 8 and 9 at the Congress Hotel.

Indianapolis Opens Its Largest Show

Ninety-eight Exhibitors Show
Cars, Trucks and Accessories
—Building Crowded

INDIANAPOLIS, Sept. 1 (*Special Telegram*)—The largest automobile show that Indianapolis ever has staged opened to-day in the new Manufacturers' Building at the State Fair grounds with ninety-eight exhibitors of motor cars, trucks and accessories. The automobile display is the most prominent feature of the State Fair show. The building has 80,000 sq. ft. of space, all of which has been taken by dealers anxious to put their goods before the buying public.

The automobile show is being staged under the auspices of the Indianapolis Automobile Trade Association, with John B. Orman as manager. It was formally opened at noon to-day by an address by President Jordan of the Jordan Motor Car Co. of Cleveland. Dealers from every county of Indiana and their prospects saw the displays.

The exhibition will continue throughout the week.

NEW ADMINISTRATION BUILDING

PONTIAC, MICH., Aug. 30—Construction of an administration building for the Oakland Motor Car Co., to cost in the neighborhood of \$250,000, will commence next week, it is expected. It will be a four-story structure 384 x 54 ft. Increase of production in the last few months, coupled with the need for adequate office space, necessitated the expansion. Not only will the executive and clerical staffs be afforded sufficient room, but the extra factory space, which will be released when the present offices are moved from the main building, will facilitate certain other increases in production capacity.

BLAIR SUING ON PATENT CHARGE

NEW YORK, Aug. 30—Papers have been filed by F. R. Blair & Co. in a suit against the Sneed Iron Works of New Jersey for alleged infringement of the Flexite patents covering flexible disk universal joints. Similar suits against other manufacturers alleged to infringe will shortly be brought.

DUFF MAKING ADDITION

PITTSBURGH, PA., Aug. 30—The Duff Mfg. Co. is constructing an addition 160 x 80 ft. designed to accommodate the forge shop and heat treating department. The completion of this shop about Oct. 1 will enable production to be largely increased.

WALDEN-WORCESTER ADDITION

WORCESTER, MASS., Sept. 2—Construction of a \$250,000 factory for Walden-Worcester, Inc., will begin this week. The new building will be on Shrewsbury Street. It will be four stories, 33 x 60 ft., of reinforced concrete. General and

private offices of the company as well as the plant hospital and service rooms will be on the top floor. Factory administration offices will be on the second floor. The rest of the building will be used for manufacturing. The remaining one-story factory building for which contract will be let shortly will provide 12,000 sq. ft. and will house the power plant, nickel plating and hardening departments. The company expects to occupy its new building by Jan. 1, and will require 250 employees.

War Time Metal Industry in Canada Will Open in U. S.

TORONTO, ONT., Aug. 30—The Pressed Metals Co. of Canada has decided to establish a plant in the United States. The invention of the process was conceived during the war and a large production of shrapnel tubes, amounting to between 30,000 and 40,000 a day, was reached during the height of the munition business in Canada. The end of the war made it advisable to embark on the proposition as a commercial undertaking. The securing of a large contract from the Ford Motor Co. of Canada was one of the first marks of recognition by the American automobile manufacturing companies.

Plans were made soon afterward for building a plant in the United States. A site of 15 acres to the south of Port Huron and with a frontage of 600 ft. on the St. Clair River was secured, and the erection of the first unit of the plant will be begun within the next few weeks. A production of a 100,000 to 120,000 bushings a day will be reached, according to the estimate of an official of the company. The cost of the plants has been placed at \$650,000.

It is also the intention to erect a plant on the Canadian side of the St. Clair River near Sarnia, but this will not be built for at least a year and possibly longer.

ARMLEDER DISCONTINUES WAGONS

CINCINNATI, Aug. 30—The O. Armleder Co., which has been building delivery wagons for the last 38 years and trucks for the past ten, has discontinued the horse-drawn vehicle business. It is remodeling its plant to devote it exclusively to motor truck manufacture with facilities for 20 trucks per day.

TWELVE TALKS TO ENGINEERS

BUCHANAN, MICH., Aug. 30—The Clark Internal Gear Drive Axle has published a booklet containing a series of twelve talks to engineers, which, it explains, is largely a reprint of a similar series published some time ago, and now republished in response to numerous requests.

SELLING DIRECT TO TRADE

HARRISON, N. J., Aug. 30—The Driver-Harris Co. is now selling its wire rope products direct to the trade instead of through its former selling agents.

Boyer's Frontenac Wins At Uniontown

Milton in Duesenberg Out by
Fire—Speed Was 96.4
Miles Per Hour

RESULTS AT UNIONTOWN

1	Joe Boyer, Frontenac.....	2:24:19:68
2	Roscoe Sarles, Philbrin.....	2:25:51:18
3	Louis Chevrolet, Frontenac..	2:26:58:81
4	Ralph Mulford, Frontenac..	2:28:54:98
5	Dave Lewis, Meteor.....	2:31:29:27
6	Art Klein, Peugeot.....	2:34:43:92
7	T. Nicholson, Hudson.....	2:35:31:86
8	Wilmer Monahan, Duesenberg	2:37:07:68

UNIONTOWN, PA., Sept. 1 (*Special Telegram*)—Joe Boyer drove Gaston Chevrolet's Frontenac car to victory in the 225 mile autumn classic at the Uniontown Speedway here this afternoon. He made the grind in 2:24:19:68, at an average speed of 96.4 miles per hour. Flames bursting from Tommy Milton's Duesenberg car robbed him of first position in the 190th of the 200 laps, while he was driving three laps ahead of the field.

A broken connecting rod caused the fire that burned the machine. Milton and his mechanic, W. D. Kessler, escaped by jumping head first. Each sustained minor burns. While the crowd, estimated at from 40,000 to 50,000, gazed at the spectacular fire, Boyer romped home for the \$7,500 purse.

Roscoe Sarles, driving Ira Vail's Philbrin, came in for second money. Other winners in succession were: Louis Chevrolet, Frontenac; Ralph Mulford, Frontenac; Dave Lewis, Meteor; Art Klein, Peugeot; T. N. Nicholson, Hudson, and P. W. Monahan, Duesenberg. Sarles, Mulford, and Monahan made the 225 miles without a stop. Race followers considered this a remarkable achievement for such a distance.

The Speedway purse was \$14,000, while the Goodyear Tire & Rubber Co. put up \$5,000, and the Mason Tire & Rubber Co. \$10,000. Boyer, Sarles and Louis Chevrolet divided the Goodyear \$5,000, and Dave Lewis got the Mason \$10,000 purse.

The comparatively few stops at the pits seemed one of the remarkable features of the race. While three cars made it non-stop, Boyer, Louis Chevrolet and Tommy Milton made one trip each to the pits. Klein made six stops and Lewis five. All were for tire changes.

The heavy grind developed several weak spots in the wooden bowl. At one end of the curve a flag was projected through a gaping hole to warn drivers, but Louis Chevrolet soon knocked it off. Jimmy Murphy, Tommy Milton's teammate, worked his car in the qualification round but was slightly injured.

To-day's race was the longest ever held on the Uniontown course, all previous events having been of a distance of 112½ miles or less.

MITCHELL MAKES CLOSED BODIES

RACINE, WIS., Sept. 2—The Mitchell Motors Co., Inc., is building its own closed bodies for Mitchell cars.

Saxon Plant Taken By General Motors

Manufacture of Scripps-Booth
Probable There—Govern-
ment Using Plant

DETROIT, Aug. 30—The General Motors Corp. has purchased the new plant of the Saxon Motor Car Corp. located at Springwells. General Motors officials state that it has not been definitely decided just what will be done at the Saxon plant. It is generally reported, however, that the Scripps-Booth will be manufactured there, as for some time Scripps-Booth production has been carried on in other units of the General Motors plants that already are overcrowded with their own products.

It will not be possible, it is thought, to determine just what will be done with the new Saxon plant until after it is entirely vacated by the government, which has been using it for storage purposes. Definite information as to when this will be is not available.

The Saxon Motor Car Co. is manufacturing in its Beaufait Avenue plant. Rumors which connected this concern in a merger with the Harroun company caused a lively action in both Saxon and Harroun stock, but nothing definite has transpired in this direction, as far as could be learned.

AUTHORIZE VEHICLE TRANSFER

WASHINGTON, Aug. 31—A bill has been introduced in Congress to authorize the transfer of motor trucks and passenger cars to the Department of Agriculture by the War Department. The bill was made necessary by a recent decision by the Judge Advocate of the Army, who found the Post Office Act of February, 1919, void. This decision held up the transfer of the 23,000 trucks asked by the Department of Agriculture from the War Department.

Program Announced For Credit Meeting

NEW YORK, Sept. 3—The program for the annual credit convention of the Motor and Accessory Manufacturers' Association, to be held at Buffalo, Sept. 11-13, was announced here to-day by officials of the association. Credit problems, with their wide ramifications through the industry, will be discussed, both by speakers and in open conference. Among those who are scheduled to speak are the following:

F. R. Wilhelmy, assistant treasurer, Standard Parts Co.; M. C. Dittman, vice-president, American Bronze Corp.; Edward Ailes, manager Credit Interchange Bureau of the National Association of Credit Men; Joseph A. Bower, vice-president of the Liberty National Bank of New York City; J. M. McComb, assistant treasurer of the Crucible Steel Co. of America; H. D. Altree, vice-president, American Bosch Magneto Co.;

R. E. Hayslett, treasurer, Hydraulic Pressed Steel Co.; I. K. Schnaitter, credit manager, Willard Storage Battery Co., and H. A. Tongue, credit manager, Firestone Tire Co. In addition, officers of the association who will speak are C. E. Thompson, the president; J. S. Marvin, of the traffic department; C. A. Burrell, manager of the credit department; M. L. Hemmingsway, general manager, and Sydney S. Meyers, general counsel.

A golf tournament and a trip to Niagara Falls, as well as other social activities, are planned as part of the convention.

Purchasing Agents Program Covers Important Phases

PHILADELPHIA, PA., Aug. 30.—The convention program for the meeting of the National Association of Purchasing Agents, which will take place here Sept. 22-24, at the Hotel Bellevue-Stratford, is now complete. An attendance of over 1,000 buyers from all industries is expected. The papers are broad in their aspect, covering important phases of the industry in general. The program follows:

Sept. 22.—"Relations Between the Purchasing Agent and His Company Organization," by F. A. Marsh, Link Belt Co., Chicago, Ill. "Relation Between the Purchasing Agent and Salesman," by G. W. Sanborn, United Engineering & Foundry Co., Pittsburgh, Pa. "The Coal Situation," by J. D. A. Morrow, Secretary, National Coal Association, Washington, D. C.

One hour for group or extemporaneous discussion on matters presented by members. "Relation of Credits to Purchasing," by J. H. Tregoe, Secretary, National Association of Credit Men, New York City. "Analysis of the Purchasing Agent," by K. H. Taylor, Illinois Glass Co., Alton, Ill. "Relation of Traffic and Stores Departments to Purchasing," by T. J. Heffernan, American Tube & Stamping Co., Bridgeport, Conn.

Sept. 24.—Election and installation of officers; deciding place of next convention.

Ten Broeck Plans New Fabric Tire

LOUISVILLE, KY., Sept. 3—The Ten Broeck Tyre Co. is planning to build a fabric tire which will carry an 8000-mile guarantee.

This decision is the result of a reorganization which followed the death of the former president, H. L. Lewman, and the resignation of the former manager, W. C. Lewman. Active management of the company now is in the hands of R. J. Garrene, vice-president and general manager, with Walter H. Grote, assistant general manager and factory superintendent, and W. Z. Nedden, general manager of sales. The new president is William Cox.

The plant is being equipped with new machinery, which will enable the present production of 500 per day to be doubled by the middle of September.

UNION TRUCK PLANT

BAY CITY, MICH., Aug. 30—Plans have been completed for the new plant to be erected in this city for the Union Motor Truck Co.

Effect of Lifting British Import Ban

American Automotive Exporters
in Unique Position—Other
Industries Normal

NEW YORK, Sept. 3—The removal of British import restrictions on almost all kinds of products (as indicated in AUTOMOTIVE INDUSTRIES of Aug. 28) has become an accomplished fact. American manufacturers of automotive products may now ship freely to the United Kingdom under the former import tariff of 33½ per cent, according to cables to local newspapers.

It is not expected that there will be any great and sudden influx of American products, with the exception of passenger cars, trucks and parts. The exchange situation has been extremely unsatisfactory and the feeling seems to be that it will have a detrimental effect on the general run of imports.

Automotive products, however, form a notable exception. There is an acute car famine in Europe, particularly in England, and, as the United States is now the only active producer of automobiles, it is anticipated here that the American export business in cars and trucks will be limited only by production.

Market in Great Britain

In an interview with the correspondent of the New York Times, Frank Lyman Libby, managing director of the British Willys-Overland Co., of London, pointed out that there was a big market in Great Britain for American cars irrespective of the exchange difficulty. He said, in effect, that although the present rate of exchange on the pound sterling was equivalent to an added duty of 15 per cent and that a car selling for \$1,000 in America now cost 22,000 francs, or \$5,000, in France, conditions indicated that there was ample opportunity for sales.

He added, that although British car makers had increased their means of production during the war, production now was negligible, the cause being labor troubles and uncertainty as to what the Government intended to do. Libby stated that an Overland factory soon would be established in England.

A further statement was that England may reduce her present import duties to 15 per cent, in agreement with France and Italy. Such reduction, however, cannot come into force before May 1, 1920, it was said.

There are apparently only two items of automotive interest included in the so-called "key industries" that are still prohibited. These are magnetos and gasoline.

Export of American passenger cars to the United Kingdom has already commenced under the restricted ruling made some time ago, but now that all restrictions are removed it is anticipated that heavy shipments will be made.

Canadian Plant of Overland Enlarged

TORONTO, ONT., Aug. 30—A new manufacturing program, by which Overland cars will be completely built in Canada by Canadian workmen, was announced here to-day by Willys-Overland, Ltd., the Canadian branch of the Toledo company. Announcement also was made that the Overland Four, the perfection of which previously has been given out, would be made here, as well as the other cars of the Overland company.

Extensive preparations have been under way here for some time for the building of cars for Canadian sales. The plant now has 280,000 sq. ft. of floor space and this will be increased soon by more than 100,000 sq. ft. of additional space. New equipment to a value of about \$1,000,000 has been purchased. The personnel of the Canadian organization has been greatly strengthened. T. A. Russell is president and general manager. The company is financed to a large extent by Canadian capital.

DEFIANCE TIRE & RUBBER CO.

DEFIANCE, OHIO, Aug. 30—The Defiance Tire & Rubber Co. has been chartered with an authorized capital of \$600,000 to manufacture tires and tubes for automobiles. The incorporators are Edward W. Saltsman, J. H. Heller, Charles E. Smoyer, Nellie P. Grunigan and F. O. Smoyer.

Hoffman Bros. Plan New Six-Cylinder Car

ELKHART, IND., Sept. 3—The Hoffman Bros. Motor Co. will put a new six-cylinder passenger car on the market after Dec. 1, and is erecting a \$200,000 addition to the present motor truck plant here, which will be completed before winter and will be used for the increased production.

No details of the construction of the new passenger car have yet been made public. The Hoffman Bros. company established the truck plant here a year ago, and has been averaging five trucks a day. The passenger car output will be ten a day.

CARS ADOPT PREST-O-LITE

INDIANAPOLIS, IND., Sept. 2—Three manufacturers of motor cars, the Chandler, Grant and King, have adopted the Prest-O-Lite storage battery for standard lighting and starting equipment. Type 613 R. H. N. has been selected.

IMPORT LICENSE REGULATION

WASHINGTON, Sept. 2—The War Trade Board Section of the Department of State announces for the information of importers that American consuls abroad have been instructed that it is no longer necessary to require evidence of the issuance of an import license before

certifying an invoice covering the shipment of any commodity whatsoever, notwithstanding such commodity may be one whose importation is still subject to control by individual license. The foregoing regulation supersedes and cancels the regulation contained in the third paragraph of W. T. B. R. 533, issued January 26, 1919.

Commonwealth Has New Touring Model

CHICAGO, Sept. 2—Several improvements and refinements are embodied in the 1920 model touring car announced by the Commonwealth Motors Co. The wheelbase has been increased from 115 in. to 117 in., permitting the fitting of a body having 3 in. additional room at the rear end. The frame is Parish & Bingham, of drop rear end type and 5 in. channel section and the rear springs are underslung in the new model.

The full-floating axle remains as before, but final drive is now of spiral bevel type instead of the straight bevel used formerly. A 3½ x 5 in. Lycoming engine is used. The price of the new model is \$1,395, as compared with \$1,195 for the preceding model. Wire wheels are fitted at an extra cost of \$125.

RICHARDSON-PHENIX

MILWAUKEE, WIS., Sept. 1—The Richardson-Phenix Co., a manufacturer of mechanical lubricating devices, has reorganized its executive personnel. J. Wm. Peterson becomes president and treasurer, and Louis E. Strothman, vice-president and general manager. Strothman has resigned as manager of the steam turbine and pumping engine department of the Allis-Chalmers Mfg. Co., to take the active works management.

TITAN BUILDING ADDITION

MILWAUKEE, Aug. 30—Ground has been broken for a large extension to the factory of the Titan Motor Truck Co., which will be ready about Oct. 15 or Nov. 1 and provide a 300 per cent increase in capacity. The building will be 150 x 160 ft., and provide a new machine shop, assembling floor, service station, shipping room and offices.

ADDITION TO BODY PLANT

INDIANAPOLIS, Aug. 29—Irvin Robbins & Co., a body-building concern, will begin immediately the erection of an addition to its plant here. The building will be two stories high, of brick veneer, 60 ft. wide and 400 ft. long, costing approximately \$80,000.

CLYDE CARS EXPANSION PLAN

CLYDE, O., Sept. 2—A special meeting of the board of directors of the Clyde Cars Co., truck makers here, has been called for Sept. 20. The directors will consider increasing the company capitalization, with consequent plant extension. Increasing business was given as the reason for the probable expansion.

Willys-Overland Prices Are Named

Production to Be Rushed—Deliveries of New Six Probable in January

TOLEDO, OHIO, Aug. 30—The Willys-Overland Co., Toledo, Ohio, and Elyria, Ohio, is clearing decks for big production. The labor troubles are now virtually at an end. The decision to concentrate on two models, the Overland Four, which is the small poppet valve four, developed during the past three years, and the Willys Four, fits in with the big production scheme now arranged.

The capacity of the Toledo plant, which is probably from 700 to 800 cars per day, will doubtless be taxed when the company is in full swing. The daily production for the early part of September will run about 250 to 300 Overland cars per day, this being rapidly increased until the ultimate schedule is reached.

Prices have been fixed on both the Overland Four and the Willys-Knight, these being in accordance with the following:

Overland Four—Touring, \$845; roadster, \$845; sedan, \$1,375; coupe, \$1,225.

Willys-Knight—Touring, \$1,750; roadster, \$1,750; sedan, \$2,550; coupe, \$2,500.

The Willys Six, which will be manufactured by the new Willys Corp., probably at the Duesenberg plant, will be in production by January and exhibitions of the first models will be made at the New York show. Deliveries will probably start immediately thereafter.

New Cleveland Has Orders for 30,000 Cars

CLEVELAND, Aug. 30—The Cleveland Automobile Co., although but a few months old and with its factory recently completed, has orders for more than 30,000 cars for the present automobile year, and has issued orders for increasing the capacity of its plant. The factory has been in production since July 31. On that day, 103 working days after the building was started, the first Cleveland Six was completed. Most of the distributors now have cars.

LOUISVILLE DEALERS' SHOW

LOUISVILLE, KY., Aug. 30—The twelfth annual exhibition of the Louisville Automobile Dealers' Association will be held Feb. 23-28 in the First Regiment Armory, which covers 54,000 sq. ft. of floor space. Additional space will be afforded the accessory displays if the contemplated use of the balcony is effected.

MACCAR EXPORT OFFICE

SCRANTON, PA., Aug. 29—An export office has been opened by the Maccar Truck Co. at 21 Park Row, New York City. M. S. May, in charge of this new department, was formerly secretary of the Roman Trading Corp.

John Jay Heads**Pierce-Arrow**

BUFFALO, N. Y., Aug. 30—John C. Jay, Jr., was elected president of the Pierce-Arrow Motor Car Co. to succeed Col. Charles Clifton, chairman of the board. George W. Mixter was appointed vice-president and general manager, in place of Henry May, resigned. M. E. Forbes was elected treasurer to succeed W. C. Wrye, who resigned as secretary and treasurer. S. O. Fellows, as controller, will assist Mr. Forbes. E. C. Pearson, formerly assistant secretary, was made secretary, and J. F. Guider succeeds G. W. Cooke as general superintendent.

Charles P. Grimes has been appointed development engineer of the Root & Van Dervoort Engineering Co. and will have charge of the dynamometer testing laboratory to be installed. Previously he has been with the Wheeler-Schebler Carburetor Co., Indianapolis, and with the National Motor Car Co. & Vehicle Corp., Indianapolis, and during the war worked at McCook Field, Dayton, O., supervising the installation of electrical dynamometer and other testing equipment for the Liberty engine.

Harry M. Giles has been appointed general superintendent of the South Philadelphia works of the Westinghouse Electric & Manufacturing Co. He succeeds Oscar Otto, who was killed in an automobile accident last month. For a number of years Giles has been superintendent of marine erection for the company.

M. F. Rumery, district sales manager of the Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis., will have charge of the new factory branch of the company opened at Omaha, Neb., at the corner of Harney and 20th streets. Rumery joined the sales force immediately upon receiving his discharge from the Naval Aviation Service. His territory includes Iowa, South Dakota, Nebraska and northern Kansas.

Charles A. Plumley, until recently commissioner of taxes in Vermont, has joined the legal department of the Firestone Tire & Rubber Co., Akron. He will handle all questions of taxation and will act as assistant to Bernard M. Robinson, the plant attorney.

E. T. Peterson, who was formerly district sales manager for the Commercial Car Unit Co. of Philadelphia, has recently become manager of the Buffalo branch of the Pennsylvania Rubber Co., Jeannette, Pa.

Louis J. McSweeney was recently elected vice-president of the newly formed Detroit Transmission Co. He has severed his connections with all other enterprises to devote his entire time to the new organization.

George H. Daubner, for the past six years chief engineer for the Barley Motor Car Co., Kalamazoo, Mich., has resigned. His future plans have not been announced. L. F. Goodspeed, member of the engineering staff, is acting as chief engineer.

Men of the Industry

Changes in Personnel and Position

CHANGES IN TIMKEN AXLE

DETROIT, Aug. 30—The resignation of Frederick C. Gilbert, vice-president and director of the Timken-Detroit Axle Co., was accepted at a recent meeting of the Board of Directors. Other changes in executives have taken place, making P. W. Hood, former assistant secretary, sales manager. He will be assisted by Frank N. Sim, who will also remain advertising manager. C. G. Rowlette, assistant treasurer, has been elected treasurer to succeed C. W. Dickerson, who will continue as secretary and credit manager.

PARRETT SALES DIRECTOR

CHICAGO, Aug. 29—J. Robin Harrison, sales promotion manager of the Parrett Tractor Co., has been appointed director of sales of that concern and will have complete charge of the sales service and sales promotion departments.

THREE OFFICES FOR BATES

LORAIN, OHIO, Aug. 30—Three principal offices have been established by the Bates Steel Mule Co. of Ohio. The main office here is in charge of A. K. Hibbard, who organized the Ohio business in Cleveland in 1918. The Cleveland office has been moved to 118 St. Clair Avenue and is managed by J. P. Jones. The Columbus business is in charge of Harvey W. Smith at 1300 Summit Street.

C. C. Newburn has been appointed assistant sales manager of the Barker Motor Truck Co., Milwaukee, Wis. Before his connection nearly a year ago with the Barker company, he was connected with the sales department of Service, Diamond T, Corliss, Panhard and Traffic trucks, during a period of about twelve years.

S. A. Taylor has been appointed foreign representative of the Garford Motor Truck Co., Lima, O. He is leaving on a trip to Africa and the Far East.

P. A. Doyle, formerly general sales manager for the Ten Broeck Tire Co., St. Louis, has recently resigned to join the International India Rubber Corp., South Bend, Ind., as manager of its central district. His headquarters will be at Kansas City, Mo.

J. H. McKeough has been appointed manager of the truck division of the Nash Motors Co., Kenosha, Wis. He succeeds L. F. Collins, who resigned to join the Memphis-Nash Motor Co.

WASHINGTON, Aug. 30—The Motor Transport Corps has been authorized to fully equip the First to Seventh Divisions with motor transportation.

CONTINENTAL AXLE ORGANIZED

EDGERTON, Wis., Aug. 30—The Continental Axle Co. has been organized with a capital stock of \$200,000 and headquarters here to take over the business and equipment of the Higgins Spring & Axle Co. of Racine, Wis. Ground has been broken here for the first unit of a new plant, 200 x 300 ft., of brick and steel. Pending the completion of the building, the present Higgins works at Racine will be continued. The present line of front and rear axles and springs for vehicles will be enlarged to embrace tractor and trailer units.

James W. Menhall, who is president and general manager of the Highway Trailer Co., Edgerton, is the prime mover in the new Continental organization, which, however, will be conducted as a distinct and separate enterprise. The two factories are located on adjoining sites. Other members of the new company are stockholders in the Highway and Higgins companies.

APPROVE STUTZ EXPANSION

NEW YORK, Aug. 28—Stockholders of the Stutz Motor Car Co. of America, meeting here to-day, approved previously announced plans by which the capital stock of the corporation will be increased from 75,000 to 100,000 shares of no par value and that the company's stated capital may be enlarged from \$375,000 to \$500,000. These additional shares will be offered, at the rate of one new share for each three shares held, to stockholders of record on Sept. 17 at \$100 a share.

The new financing is to provide for the additional plant, doubling the company's output, under construction at Indianapolis. George F. Lewis, the secretary, announced that the present production of the Stutz factory was contracted for until August, 1920. The new plant is expected to reach production early next Spring.

BIJUR STRIKE ENDED

HOBOKEN, N. J., Aug. 30—The strike of toolmakers and machinists at the Bijur Motor Appliance Co., which has been in progress since June, has been terminated and a large proportion of the men have returned to work. The settlement was made on the basis of a 48-hr. week with an increase of 5 per cent to apply to all hourly employees. The original demands were for a 44-hr. week with 48-hr. pay. Regular production of parts was not affected.

ANDERSON STOCK INCREASE

ROCK HILL, S. C., Aug. 30—Stockholders of the Anderson Motor Co. have voted to increase the capital stock from \$2,625,000 to \$3,625,000. In order to bring the daily output up to 30 cars an additional plant will be erected.

FOUNDRY FOR LOUISVILLE

LOUISVILLE, KY., Aug. 30—A \$500,000 plant will be erected here by the Illinois Malleable Iron Co., Chicago.

GENERAL MOTORS DORMITORY

FLINT, MICH., Aug. 29—The General Motors Corp. is planning to erect a dormitory building in this city for employees. The cost is estimated at about \$2,500,000. It will be a seven-story building, occupying a full block, the building proper to be 280 x 214 ft.

It will contain sleeping quarters for 1168 men, eating accommodations for 1300 men, recreational facilities for 350 persons at one time, amusement facilities for 700 persons, an auditorium with a capacity for 1279, and educational facilities for 430 persons at one time, making it possible to keep 2759 persons agreeably occupied in the building at once. It is expected that the building will be completed within 9 months.

OPERATE RADIATOR CORE PLANT

ST. LOUIS, Aug. 30—A complete radiator core manufacturing plant, installed by the Traffic Motor Truck Corp. in its new factory at 5200 North Second Street, was placed in operation last week. The plant will have a capacity of 50 complete radiator cores a day. The department was designed and installed by S. H. Dorsey, chief engineer for the corporation, the unit system of manufacture being employed.

CARLISLE WESTERN BRANCH

LOS ANGELES, CAL., Aug. 29—The Carlisle Tire & Rubber Co., Carlisle, Pa., has opened a branch here at 1003 So. Figueroa Street, which is in charge of R. C. Cooper, formerly connected with the Para Auto Tire Co., Chicago.

CHAMPION BRASS MAKES ACCESSORIES

COLDWATER, MICH., Aug. 30—The Champion Brass Works will add a line of automobile accessories to its normal manufacturing line. The concern will increase its capital stock from \$15,000 to \$75,000.

TRAFFIC TRUCK BUILDING

ST. LOUIS, MO., Aug. 30—The Traffic Motor Truck Corp. is building an addition to its plant at 5200 North Second Street. The new building will cover the block adjacent to the present Traffic plant, and it will be of modern brick construction, 150 x 200 ft.

NEW ACCESSORIES LINE

ST. LOUIS, Aug. 29—The Liberty Accessories Corporation of St. Louis, Mo., has increased its capital stock to \$100,000 and has purchased the plant of D. C. Gilliland Manufacturing Co. and will put a new line of specialties on the market in addition to the present line.

GOODYEAR LITTLE ROCK BRANCH

LITTLE ROCK, ARK., Aug. 29—The Goodyear Tire & Rubber Co., Akron, has opened a branch here at 612 Louisiana Street. W. H. Ector is manager of the branch.

**Current News of
Factories****Notes of New Plants—
Old Ones Enlarged****U. S. LIGHT WITH WILLYS**

BUFFALO, Aug. 27—That the United States Light & Heat Co. will be a unit in the new Willys Corp. was confirmed to-day. It is very probable that this concern will be considered the battery unit in the new corporation and will furnish the storage batteries for the Overland and Willys cars, as well as for the new Auto-lite farm lighting systems.

NEW HEADLIGHT CONTROLLER

FOND DU LAC, WIS., Sept. 1—The Rex Typewriter Co., Fond du Lac, Wis., is enlarging its plant and installing new equipment for the purpose of engaging in quantity manufacture of a new headlight controller for motor vehicles.

The device operates on a principle similar to that of a street car controller, enabling the operator to regulate the current within a wide range by a small lever attached to the steering column.

NEW MAKER FOR J. E. F. PLUGS

MILWAUKEE, Wis., Sept. 1—The Ramstack & Sons Mfg. Co., Milwaukee, is being organized with a capital stock of \$100,000 to manufacture the J. E. F. spark plug. The present plant of the J. E. F. Spark Plug Co. will be used by the new concern.

BULL DOG TRACTOR PLANT

OSHKOSH, Wis., Aug. 30—The Bull Dog Tractor Co. has been organized by J. H. Tritz, Eber Simpson and Arthur H. Gruenwald. A tractor design employing an all-wheel drive transmission system has been developed. The capital stock is \$750,000. A plant will be opened at once.

BRAZIERS OPEN BRANCH

NEW YORK, Aug. 29—The Peters Engineer Co., Philadelphia, is opening a factory branch of its welding and brazing service at 518 West 44th Street. Louis B. Lipschen & Co. are the metropolitan representatives.

RANDALL ADVERTISING MOVES

DETROIT, Aug. 29—The Fred M. Randall Co., a member of the American Association of Advertising Agencies, moved its general offices from the Ford Building to the Book Building.

REX IGNITION BRANCHES

NEW YORK, Aug. 29—The Rex Ignition Co., maker of the Rex plug, has opened branches in Chicago, San Francisco, Kansas City, Philadelphia and Boston.

**New Ogren Car Expected
In Production In October**

MILWAUKEE, WIS., Sept. 1—The Ogren Motor Car Co., a new \$500,000 corporation, expects to get the Ogren car into regular production in its new plant at 692-698 National Avenue by Oct. 1. The work of remodeling the former Elite rink building, 150 x 200 ft., is now under way, and the first of the new equipment is being installed. Hugh W. Ogren, former racing driver and designer of the Ogren car, is president and general manager of the new company.

OVERSEAS MOTOR CORPORATION

NEW YORK, Aug. 30—The organization of a new American company to handle automobile accessories in the foreign field has been formed as the Overseas Motor Service Corp., with offices at 1760 Broadway.

It has established direct factory connections with the following manufacturers and will act as their export sales offices: New Departure Mfg. Co., Hyatt Roller Bearing Co., Champion Ignition Co., Kellogg Mfg. Co., Moto Meter Co., Miniature Incandescent Lamp Works, Marvel Carburetor Co., Gabriel Mfg. Co., Jaxon Rim Co. and J. P. Gordon Co.

OPEN NEW LABORATORIES

PITTSBURGH, Aug. 29—The new \$1,000,000 laboratories of the Bureau of Mines, Department of the Interior, will be opened here Sept. 29-Oct. 1. Ceremonies have been arranged in which men interested in the oil industry will join with those in the mining and metallurgical field, and will have the co-operation of the Pittsburgh Chamber of Commerce. The new laboratories, although intended to cover the general needs of the mining and allied industries, devote a large part of their energies to problems arising in the oil industry.

DANIELS MACHINES FOR G. M. C.

EAU CLAIRE, Wis., Sept. 1—The McDonough Mfg. Co. has closed a contract with General Motors Corp. for its entire production of Daniels automatic multiple spindle chucking machines for an indefinite period ahead. The machines will be delivered to the Olds Motor plant at Pontiac, Mich.

MAKING TRACTOR TRANSMISSIONS

FOND DU LAC, Wis., Aug. 30—The Giddings & Lewis Mfg. Co., manufacturer of machine tools and special machinery, is establishing a new department for producing tractor transmission units.

ADDITION FOR TOOL COMPANY

MILWAUKEE, Wis., Aug. 30—The Kearney & Trecker Co., manufacturer of machine tools, is erecting a plant addition, 40 x 480 ft., to provide for enlarged capacity.

July Exports Show Big Increase Over Last Year

	Cars	1919 Value	Trucks	Value	Parts
July	4,679	\$4,975,446	905	\$2,173,303	\$2,766,150
June	7,879	8,325,563	1,775	3,908,484	4,561,287
		1918			
July	3,442	\$3,624,870	601	\$1,527,519	\$2,771,193

WASHINGTON, Sept. 2—The opening month of the Government fiscal year 1920, July, 1919, shows a substantial gain both in numbers and values of passenger cars and trucks and in value of parts shipped overseas when compared with the totals for July, 1918. A comparison on this basis indicates that the position of our export trade is excellent. It is more convincing when it is realized that we are now selling the markets of the world on a peace basis; there are no abnormal sales of war trucks or cars intended for military use.

Taking our exports by countries, a comparison shows that we are rapidly reopening trade connections which were practically closed during wartime. For example, a year ago we had no trade worthy of the name with Denmark, Norway, British India or British South Africa. Now we can supply figures which tend to show the desperate need of American cars and trucks in these countries.

Our trade with Australasia has continued throughout, but there are indications of a steady increase of automotive business both with Australia and New Zealand. Latin American trade in passenger cars is well maintained, and it is expected that our truck business with these Republics will show a substantial increase in the near future. Figures covering our sales to the Orient are not yet available, but the field is developing rapidly and is well worth intensive cultivation. Japan, in particular, offers a big opportunity. The country is wealthy and its credit is better than ever.

A steady field for automotive export is offered by the Dutch East Indies. These are buying a relatively large number of the higher-grade cars. The continuous development of the rubber industry has resulted in the accumulation of large resources and a permanent market is assured.

Although it is true that the totals for July, 1919, show up badly in comparison with those of the previous month, this is not necessarily serious. Our exports are controlled rather by the shipping available than by any lack of orders. Our September exports to the United Kingdom should touch record, owing to the removal of all restrictions by the British Government.

Exports of Automotive Equipment for July, and 6 Previous Months, and 7 Months Ending July, 1919

	1918		1919		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value
Airplanes .....	...	...	1	\$3,500	7	\$44,655	11	\$85,500
Airplane parts.....	...	\$1,913,127	...	12,365	...	7,443,615	...	3,089,385
Commercial cars.....	601	1,527,519	905	2,173,303	5,508	13,705,235	8,413	20,742,825
Motorcycles	740	159,664	1,753	461,956	6,252	1,452,367	12,267	3,300,289
Passenger cars.....	3,442	3,624,870	4,679	4,975,446	26,033	24,205,056	31,625	35,130,045
Parts, not including engines and tires.....	...	2,771,193	...	2,766,150	...	19,033,619	...	22,640,309
	1918		1919		1918		1919	
	No.	Value	No.	Value	No.	Value	No.	Value
Engines .....	...	...	...	...	...	...	...	...
Automobile, gas.....	3,698	\$730,772	1,852	\$328,789	19,816	\$2,617,144	15,602	\$2,460,730
Marine, gas.....	457	115,891	1,053	450,281	3,126	1,409,865	6,856	3,083,730
Stationary, gas.....	1,919	209,685	1,885	294,640	16,971	1,964,594	14,258	2,157,659
Tractor, gas.....	1,212	1,292,806	1,022	837,954	16,199	16,080,106	12,961	13,221,142
Total.....	7,286	\$2,349,154	5,812	\$1,911,664	56,112	\$22,071,709	49,677	\$20,923,261

Exports by Countries for July, 1919, and 7 Months Ending July, 1919

	Cars		Trucks		Cars		Trucks	
	No.	Value	No.	Value	No.	Value	No.	Value
Denmark	434	\$413,087	...	...	1,407	\$1,563,663	...	...
France	7	25,700	162	\$799,532	378	1,323,888	2,423	\$10,464,677
Norway	134	233,376	...	...	708	1,022,802	...	...
Russia in Europe.....	...	...	...	...	...	...	...	...
Spain	52	97,881	...	...	539	648,405	...	...
United Kingdom.....	316	303,848	12	18,443	1,065	1,199,408	64	123,409
Canada	612	662,548	135	235,279	5,118	4,959,381	1,002	1,492,434
Mexico	173	133,930	...	...	1,571	1,300,929	...	...
Cuba	121	145,635	69	158,981	1,325	1,577,366	470	1,027,013
Argentina.....	45	70,603	7	30,662	1,120	1,446,075	75	170,081
Chile	7	9,348	...	...	391	606,142	...	...
Uruguay	43	68,996	...	...	1,112	1,056,895	...	...
British India.....	265	270,424	...	...	954	1,056,905	...	...
Dutch East Indies.....	87	105,423	...	...	1,308	1,711,735	...	...
Russia in Asia.....	...	...	4	1,050	38	27,945	5	5,050
Australia	120	123,278	...	...	1,845	1,830,659	...	...
New Zealand.....	368	394,166	...	...	1,441	1,585,126	...	...
Philippine Islands.....	166	158,558	...	...	1,537	1,641,351	...	...
British South Africa.....	184	211,421	...	...	1,169	1,409,054	...	...
Other countries.....	1,545	1,547,224	516	929,156	8,599	9,162,316	4,374	7,460,161
Total.....	4,679	\$4,975,446	905	\$2,173,303	31,625	\$35,130,045	8,413	\$20,742,825

BRITISH SOUTH AFRICAN EXHIBITION

NEW YORK, Aug. 30—Plans have been gotten under way for a national exhibition of all characters of products to be held at Pretoria, British South Africa, early next year. Information reaching here is that, while the showing is to be confined mainly to manufactures in the British possessions of Africa, machinery, implements and automotive products from any of the Allied countries will be welcomed.

ALL AUSTRALIAN MOTOR EXHIBIT

NEW YORK, Aug. 30—An All Australian exhibition, at which motor cars, airplanes, engines and similar equipment will be shown, will be held at Adelaide, Australia, in March, 1920, according to reports reaching here. Whether exhibits from America will be welcomed could not be learned, but the advices stated that such material from Great Britain would be admitted, indicating that other countries might be barred.

TRADEMARK BUREAU

WASHINGTON, Sept. 2—An International Trademark Registration Bureau has been established at Havana, Cuba, by the International High Commission of the American continents, to provide for simplified and accurate registration of trademarks throughout the Pan-American countries, and has commenced actual operation.

The Bureau was established to bring about a revision and actual observations of the convention on trademarks signed at Buenos Aires in 1910. This was ratified in 1918 by enough states of the American continents to make possible the establishment of this Bureau. It is probable that the other Bureau provided for under the Convention at Rio de Janeiro intended to serve the ten republics of South America will be opened shortly under the auspices of the Brazilian Government.

HAVANA GETS U. S. CHAMBER

NEW YORK, Aug. 30—The formation of an American Chamber of Commerce at Havana has been announced here. The new organization has for its purpose the strengthening of commercial relations between the United States and Cuba.

CATALOGS FOR MEXICO

WASHINGTON, Sept. 2—Commercial catalogs of automobiles, accessories, parts, motors (except marine), tractors and industrial machinery are desired by the American Consulate General at Mexico City.

PERSIA NEEDS CARS

WASHINGTON, Sept. 2—There is a demand for low-priced motor cars in Persia, according to a report from the American legation at Teheran, Persia.

Army Will Train Motor Mechanics

First School to Open at Camp
Holabird—Plan Three
Others

WASHINGTON, Sept. 2.—Secretary of War Baker on Sept. 5 will formally open, at the Motor Transport Corps General Depot, at Camp Holabird, near Baltimore, a vocational school for enlisted men. There will be four hundred men in this, the first of four similar schools, to be opened by the Motor Transport Corps during the next three months for the training of enlisted men in automotive work. The other three will be at Camp Jesup, Atlanta, Ga.; Camp Normeyle, San Antonio, Tex., and Camp Boyd, El Paso, Tex.

When the four schools are in operation, it is expected that trained mechanics and chauffeurs will be graduated at the rate of about six thousand per year. The idea of the schools belongs primarily to Col. J. W. Furlow, U. S. A., who, at the time of the Pershing expedition into Mexico, was in charge of the mechanical upkeep of army trucks. Experience taught him the value of trained men.

When the United States entered the world war, four reconstruction camps were built at points strategically located with reference to the future motor transport needs in this country. These shops were designed to keep in repair the large number of motor vehicles needed by the army in this country during and after the war and to serve as training schools for the necessary mechanical personnel.

It has been found necessary to continue this plan because there is a dearth of skilled operators and repairmen available for the domestic automotive industry.

Preliminary Military Instruction Course

All men entering the Motor Transport Corp will be put through a preliminary course of military instruction of four weeks' duration. Each man will undergo a psychological test and a trade test. At the end of four weeks he will receive a classification card that will put him either into the school for chauffeurs, for repair mechanics or for inspectors and foremen.

The school of the chauffeur will last eight weeks and is designed to train drivers who will be able to safeguard a vehicle by proper inspections, to make emergency repairs, to differentiate between conditions that are serious and those which can wait for attention until it is convenient to make repairs. Each student will be drilled on the rules of the road, especially driving in convoy formation.

Ten parallel courses of instruction of sixteen weeks each are provided for in the school for mechanics. Each of these courses is founded upon some fundamental trade, and is intended to prepare

Arc de Triomphe Open to Motor Traffic



After 48 years, the "no thoroughfare" chains around the Arc de Triomphe were removed last month, and automobiles for the first time have been permitted to pass under it. After the German troops marched into Paris in 1871, heavy chains were placed around the arch and the roadway barred to all traffic. This year, nearly 48 years later, the chains were removed for the triumphal passage of the Allied armies, and traffic again is permitted

a man to enter a given line of work in commercial life. The courses are for machinists, automobile mechanics, ignition and carburetor specialists, battery repairmen, welders, tire repairmen and wheelwrights, blacksmiths and spring makers, sheet metal and radiator workers, wood workers and salvage experts.

The next course will be for those men who excel in the work of the preceding courses and who, in addition, are able to handle men. Such students will be eligible for foremen or inspectors, possibly, in time, for teachers in these schools. This course of instruction covers sixteen weeks and is designed to round out the pupils' previous experience.

Technical Course

The last and highest grade in the school plan is a course of sixteen weeks in one of the stronger technical schools of the country. It is especially planned for men of good education, who have had the training given in the preceding courses as well as considerable motor transportation experience. By this year of instruction, it is hoped to qualify them for positions of responsibility in the automotive field.

A precedent is being established in these schools not only in that they are the first vocational schools of the army, but likewise in the fact that civilians as well as officers are to be used as instructors. Dean A. Fales, formerly of the gas department of the Massachusetts Institute of Technology, will head the Holabird school.

Output of Airplanes Was High in France

PARIS, Aug. 18 (Staff Correspondence)—France produced 85,317 aviation engines during the war. The wonderful growth of this branch of war industry has been revealed in the official figures just made public. In 1914 the output was 3481 engines; in 1915 it was 6849; in 1916, 13,874; in 1917, 20,805, and during 1918 it increased to 40,308 engines.

The production of airplanes was 67,982 during the whole of the war, the individual figures being:

1915.....	3,460
1916.....	7,552
1917.....	22,751
1918.....	34,219

When the war ended the aviation factories of France were employing 186,003 workers. This industrial army had grown from 12,650 on Jan. 1, 1915, to 30,960 on Jan. 1, 1916, 68,920 at the beginning of 1917, and 131,551 at the beginning of 1918.

The flying personnel of the French Air Service was 12,919 men Dec. 1, 1918. During the war, from Aug. 4, 1914, to Nov. 11, 1918, there were killed on the front 1945 pilots and observers, during the same period 1461 were reported missing, and are now believed to be dead, and 2922 were wounded. In the interior zone, comprising schools, etc., the losses were 1927 pilots and observers.

Calendar

SHOWS

- Sept. 13-20—Cincinnati, O. Ninth Annual, Music Hall, Cincinnati Automobile Dealers' Assn., H. K. Shockley, Manager.
- Sept. 15-20—Springfield, Mass. Eastern States Exposition.
- Sept. 24-Oct. 4—New York, N.Y. New York Electrical Show, Grand Central Palace.
- October—Ft. Dodge, Ia. Fall Motor Show, District Fair Grounds.
- Oct. 6-11—Detroit, Mich. Closed Car Show, Arena Gardens. Detroit Auto Dealers' Assn., H. H. Shuart, Mgr.
- Oct. 11-18—Pittsburgh, Pa. Fall Show.
- Oct. 15—New York City. Opening of International Farm Tractor and Implement Exchange, Grand Central Palace.
- Nov. 3-8—Chicago, Ill. Business Exhibit of Automotive Equipment Assn., Medinah Temple.
- Nov. 16-23—New York Automobile Salon, Hotel Commodore.

- January—New York. International Automobile Mfrs. Congress.
- Jan. 3-10—New York, N. Y. Grand Central Palace. National Automobile Chamber of Commerce, S. A. Miles, Manager.
- Jan. 3-10—New York City. Eighth Coast Artillery Armory, commercial cars and accessories.
- Jan. 24-31—Chicago, Ill. Coliseum, Cars; Drexel Pavilion, Trucks; National Automobile Chamber of Commerce, S. A. Miles, Manager.
- Jan. 24-31—Chicago. International Amphitheater, commercial cars and accessories.
- February—Chicago. International Automobile Mfrs. Congress.
- February—Deadwood, S. D. Annual show, Deadwood Business Club, F. R. Baldwin, Manager.

FOREIGN SHOWS

- Aug. 23-Oct. 6—Toronto, Can. Cars, Trucks and Tractors, Airplanes and Motor Boats in conjunction with Canadian National Exhibition.
- Sept. 6-16—Ottawa, Ont.—Central Canada Exhibition.
- Sept. 10-24—Christiania, Norway. Exhibition of American goods at Trivoli Exhibition Grounds.
- Sept. 24-27—London, Eng. Commercial Vehicles Exhibition, Olympia Society of Motor Mfrs. & Traders, Ltd.
- Sept. 24-27—Lincoln, Eng. Tractor trial. Society of Motor Manufacturers and Traders, Ltd.
- Sept. 24-27—Lincoln, Eng. Exhibition of tractors and agricultural vehicles, in connection with the tractor trials.

- *Oct. 9-19—Paris. Grand Palais, International Automobile Mfrs. Congress.
- Oct. 14-16—Ottawa, Ont., Can. Interprovincial Plowing Match and Tractor Demonstration.
- November—Christchurch, N. Z. First National Motor.
- Nov. 7-16—London. Olympia Motor Car Exhibition—Society of Motor Mfrs. and Trades.
- December—Brussels. International Automobile Mfrs. Congress.
- January—Glasgow, Scotland. Scottish Motor Exhibition.
- February—Manchester, Eng. North of England Motor Exhibition.
- Feb. 23-March 6—Birmingham, Eng. British Industries Fair.
- March—London, Eng. Motor Boat, Marine and Stationary Engine Exhibition.
- April or May—London, Eng. Commercial Vehicles Exhibition, Olympia.

AUTOMOTIVE SHOWS AT FAIRS

- Sept. 1-5—Hartford, Conn. Connecticut Fair Assn.
- Sept. 1-5—Wheeling, W. Va. Cars, trucks and tractors.
- Sept. 1-5—Philadelphia. Tractor Demonstration and Truck Show, Philadelphia County Fair.
- Sept. 1-6—Indianapolis, Ind. State Fair. Cars and Accessories. Indianapolis Automobile Trade Assn., John B. Orman, Manager.
- Sept. 1-6—Rochester, N.Y. Automobile Club of Rochester. E. F. Edwards, Manager.
- Sept. 1-6—Spokane, Wash. Cars, trucks and tractors.
- Sept. 8-13—Helena, Mont. Cars, trucks and tractors, Montana State Fair.
- Sept. 8-13—Milwaukee, Wis. Milwaukee Automobile Dealers, Inc., Bart J. Ruddle, Manager.
- Sept. 8-13—Syracuse, N. Y. Cars, trucks and tractors.
- Sept. 8-13—Topeka, Kan. Cars, trucks and tractors, Motor Hall and Machinery Field.
- Sept. 9-13—Douglas, Wyo. Cars, trucks and tractors.
- Sept. 12-20—Peoria, Ill. Cars, trucks and tractors.
- Sept. 13-20—Hutchinson, Kan. Cars, trucks and tractors.
- Sept. 14-20—Sioux City, Ia. Cars, trucks and tractors.
- Sept. 15-20—Springfield, Mass. Cars, trucks and tractors. O. A. Nash, Asst. Gen. Manager.
- Sept. 15-20—Yakima, Wash. Cars, trucks and tractors.
- Sept. 16-19—Billings, Mont. Cars, trucks and tractors.
- Sept. 18-21—Upper Creve Coeur Lake. Motor car show, St. Louis County Fair.
- Sept. 20-27—Oklahoma City, Okla. Cars, trucks and tractors. J. S. Malone, General Manager.
- Sept. 20-27—Memphis, Tenn. Cars, trucks and tractors.

- Sept. 21-27—Salem, Ore. Car and truck show. Dealers' Motor Car Assn. of Oregon, Oregon State Fair.
- Sept. 22-27—Allentown, Pa. Lehigh County Agricultural Assn.
- Sept. 22-27—Pueblo, Colo. Cars, trucks and tractors. J. L. Beaman, Manager.
- Sept. 22-27—Salem, Ore. Cars, trucks and tractors. Dealers' Motor Car Assn., M. O. Wilkins, Manager.
- Sept. 24-Oct. 4—Kansas City, Kan. Cars, trucks and tractors.
- Sept. 29-Oct. 4—Meridian, Miss. Cars and tractors. A. H. George, General Manager.
- Sept. 29-Oct. 4—Chattanooga, Tenn. Chattanooga Auto Dealers' Assn.
- Sept. 29-Oct. 4—Muskogee, Okla. Cars, trucks and tractors.
- Sept. 30-Oct. 3—Brockton, Mass. Cars.
- Sept. 30-Oct. 4—Lancaster, Pa. Lancaster Fair Assn.
- October—Columbia, S. C. Columbia Automobile Dealers' Assn.
- Oct. 6-19—Dallas, Tex. Cars, Trucks and Tractors, Texas State Fair.
- Oct. 20-25—Raleigh, N. C. Cars, trucks and tractors.
- Oct. 22-27—Shreveport, La. Cars, trucks and tractors.
- Oct. 27-31—Columbia, S. C. South Carolina State Fair Assn.

TRACTOR SHOWS

- September—Los Angeles, Cal. Regional Tractor Demonstration under the auspices of the National Implement & Vehicle Assn.
- Sept. 1-6—Greenville, S. C. Agricultural Implements and Tractors. F. M. Burnett, General Manager.
- Sept. 8-13—Huron, S. D. Cars, tractors, trucks, automotive equipment. C. N. McIlvane, Manager.
- Sept. 9-12—Streator, Ill. Northern Illinois Tractor & Truck Assn.
- Sept. 15-20—Allentown, Pa. Lehigh County Agricultural Assn.
- Sept. 22-28—Waterloo, Ia. Automobile show, in connection with Waterloo Dairy Cattle Congress; Black Hawk County Motor Trades Bureau, G. V. Orr, Secretary.
- Oct. 15-18—Charleston, W. Va. Tractor Demonstration, Kanawha County Fair.
- Nov. 22-29—Jacksonville, Fla. Florida State Fair and Exposition. B. K. Hanaford, Manager.
- February—Kansas City, Mo. Fifth Annual Kansas City Tractor Club, Guy H. Hall, Manager.
- Feb. 9-14—Wichita, Kan. Tractor and Farm Machinery, Forum, Wichita Thresher-Tractor Club.

CONTESTS

- Sept. 20—Sheepshead Bay, L. I. Speedway race.
- Sept. 27—Allentown, Pa. Dirt track event.

- Oct. 4—Trenton, N. J. Dirt track event.
- Oct. 11—Cincinnati, O. Speedway race.
- Oct. 11—Danbury, Conn. Dirt track event.
- *Nov. 27—Los Angeles, Cal. Ascot Speedway race.
- July, 1920—Paris, France. Grand Prix Race, Sporting Commission, Automobile Club of France.

*Tentative date.

CONVENTIONS

- Sept. 8-9—Chicago. Industrial Conference Illinois Mfrs. Assn., Congress Hotel.
- Sept. 11-12—Buffalo, N. Y. Annual Credit Manufacturers' Convention, Motor and Accessory Mfrs. Assn., Hotel Lafayette.
- Sept. 21-25—New Orleans. Fifteenth Annual Convention of Associated Advertising Clubs of the World.
- Sept. 22-24—Philadelphia. Annual Convention, National Association of Purchasing Agents, Bellevue-Stratford.
- Sept. 22-27—Chicago. Annual Convention of Carriage Builders' National Assn., Hotel LaSalle.
- Sept. 24-25—Sheffield, Eng. Institute of Metals.
- Oct. 1—Denver, Colo. Directors' Meeting, National Automobile Dealers' Assn.
- Oct. 1-4—Cleveland. Eighth annual safety congress of National Safety Council.
- Oct. 9-10—Jackson, Miss. Second Annual Convention, Louisiana-Mississippi Assn.
- Oct. 14-17—Atlantic City, N. J. Twenty-fifth Annual Convention, Marlborough-Blenheim, National Hardware Association of the United States.
- Oct. 29—Washington, D. C. Annual Labor Conference provided by Peace Treaty.
- November—London, Eng. Road Transport Congress and Exhibition.
- Nov. 3-8—Chicago, Ill. Convention, Automotive Equipment Assn., Medinah Temple.
- Nov. 7-8—Detroit. Meeting of National Assn. of Motor Truck Sales Managers, Hotel Statler.
- Dec. 3-5—Cleveland. Ohio Automobile Trade Assn., Annual Convention.
- January, 1920—Washington. Pan-American conference.
- Feb. 9-13—Louisville, Ky. Seventeenth Annual Convention American Road Builders' Assn., Tenth American Good Roads Congress and Eleventh National Good Roads Show.
- May 15-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

Consular Officers Here
Will Meet Business Men

WASHINGTON, Sept. 2.—The following American consular officers are on leave of absence in the United States and will be glad to confer with business men and commercial organizations relative to conditions in their respective jurisdictions: Frederick T. F. Dumont,

Florence, Italy, returns Sept. 22, can be seen at Farmers' Trust Co., Lancaster, Pa.; Arthur C. Frost, Algiers, Algeria, returns Sept. 27, can be seen at 98 Oxford Street, Arlington, Mass; Robert Harnden, Seville, Spain, returns Aug. 31, can be seen at 2715 Durant Avenue, Berkeley, Cal.; Carlton Bailey Hurst, Barcelona, Spain, returns Aug. 31, can be reached care Consular Bureau, Department of State; Vivian L. Nichol-

son, Buenos Aires, Argentina, returns Sept. 28, can be reached care Consular Bureau, Department of State; Bradstreet S. Rairden, Reviere du Loup, returns Aug. 14, care General Post Office, Bath, Me.; John Q. Wood, Tiflis, Russia, returns Sept. 10, can be seen at Bucksport, Me.; DeWitte C. Pool, Archangel, Russia, returns Oct. 2, address care F. F. Bowman, Madison, Wis., according to an announcement from Washington.